Zero Retries issue 0229 2025-11-21

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3300+ subscribers.

About Zero Retries

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Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Prefers to Remain Anonymous 0108** for upgrading from a free subscriber to Zero Retries to a **Founding Member Subscriber 0019** this past week!

Founding members are listed in every issue of Zero Retries!

My thanks to **Marvin Motsenbocker "Mots" AK4VO** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 107** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

My thanks to **Jason McCormick N8EI** for *upgrading* from a free subscriber to Zero Retries to a **Paid Subscriber** this past week!

My thanks to **Mitchell Boyce W8DOD** for becoming an **Annual Paid Subscriber** to Zero Retries this past week! PTRA 110 included this nice message:

> I think it's important that ideas and information are shared freely through the ham radio community and I appreciate the work that you put in to do this.

My thanks to **Prefers to Remain Anonymous 109** for becoming a **Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Zero Retries is the only ham radio periodical I read

I mentioned in **Zero Retries 0228**:

> My thanks to Florian Lengyel WM2D for renewing as an Annual Paid Subscriber to Zero Retries this past week (3rd year)!

As is my habit, I replied with a personal email thanking WM2D for renewing their subscription, and WM2D replied by saying:

> Zero Retries is the only ham radio periodical I read.

Wow. *That is humbling*.

In another email message:

> Thanks to Zero Retries, I'm back on the air (D-Star via the m1ke), aside from Chirp Spread Spectrum on 900MHz.

That is what I strive for in Zero Retries, to present the interesting, technical, and *relevant* aspects of Amateur Radio in the 21st century, that you probably won't hear about from any other Amateur Radio media. Hopefully Zero Retries inspires folks, as happened with WM2D, to get involved or re-involved with Amateur Radio with these amazing new technologies.

Thank you very much WM2D! Your support, and the other paid subscribers helps me keep going on Zero Retries.

Logo courtesy of Mound Diablo Amateur Radio Club

Presentation to Mount Diablo Amateur Radio Club tonight (2025-11-21) at 19:00

Tina and I have been impressed with the Pacificon conference (2024 and 2025), sponsored by Mount Diablo Amateur Radio Club. We were invited to be the presenting speakers at MDARC's November 2025 General virtual meeting, which will be held on Friday 2025-11-21 at 19:00 Pacific (Saturday 2025-11-22 at 03:00 UTC) via Zoom:

https://us06web.zoom.us/j/87314224901pwd=0swnc2UTtucJnd8wHZ28Zcpcp2cC3e.1
Meeting ID: 873 1422 4901
Passcode: 049211

Our topic will be:

ZRDC 2025, a Zero Retries view of Pacificon 2025, M17 - an Open-Source Digital Voice mode, the LinHT, and SuperPeaters

(That title was a tad ambitious for a one hour speaking slot, but we will try to fit all that in.)

I don't see an indication on MDARC's Speakers page that they make archived recordings of their online meetings available. I plan to make my slide deck available after the presentation.

Wayne Technical Fanatics

One of the new Zero Retries Paid Subscribers in the past week, Jason McCormick N8EI is a member of **Wayne Technical Fanatics**, a not-formally-organized club in Wayne County, Ohio, USA (near Wooster, Ohio). When callsigns are provided in a paid subscription, I look them up on QRZ.com and often learn about new things, like the existence of Wayne Technical Fanatics.

In my opinion, Wayne Technical Fanatics are doing a number of things *right*:

- Cool name - *Technical*, and *Fanatics!* The name gets the point across quickly that the group *isn't* a same old, same old Amateur Radio group. Also… cool acronym - ***WTF!***
- They have an informative website that folks can find and learn about the group.
- They do ambitious projects and build useful infrastructure for the common good such as multi-mode (*yay!*) repeaters and digipeaters.
- When things don't work out, they don't continue to invest time and resources in them, such as their decision to shut down "Megalink". Their priority seems to be doing interesting and relevant and fun activities and infrastructure.
- They decided to "keep it loose" - no officers, no dues, no formal affiliations… Wayne Technical Fanatics seems to have formed up to do interesting things and have technically interesting fun relating to Amateur Radio.

Gosh I wish there had been some group like Wayne Technical Fanatics in Ottawa County, Ohio when I was growing up there in the mid-1960s and 1970s.

We need more groups like Wayne Technical Fanatics to form up and promote themselves as co-conspirators in Zero Retries Interesting Amateur Radio activities.

Evangelism for Amateur Radio of the 21st Century

This storylet is a good accompaniment to the above story about the WTF group.

I was exchanging emails with a person who has tried to do outreach into their local Amateur Radio community to make Digital Amateur Radio Television (DATV) more widely known. The results… in that Amateur Radio community… weren't great. I replied:

> With respect, I don't think that same old, same old Amateur Radio Operators are the right audience to target your outreach of DATV.
>
> Reluctantly, sadly, I've come to the conclusion that the majority of Amateur Radio is the worst enemy of what Amateur Radio can be… arguably, *is*, in the 21st century.
>
> As evidence, I offer Zero Retries. It's now 3300+ email subscribers, perhaps as many as 500-1000 more, that view it via RSS or pass along or social media.
>
> That's a tiny fraction of the US Amateur Radio population, and Zero Retries will apparently stay that way because ZR discusses subjects that just don't interest the vast majority of Amateur Radio Operators. That's OK - I'm not trying to write for the masses, I'm trying to write for the folks like me that are interested in the more technical and future-forward aspects of Amateur Radio, beyond HF operation, contesting, yakking, CW, DXing on HF, etc. - basically Amateur Radio grounded in the operations and technologies of the 1950s.
>
> *Not to diss those aspects of Amateur Radio - it's a big hobby, and obviously those aspects are very popular - there are entire clubs and organizations devoted to DX, etc.*
>
> If Zero Retries was going to "catch on" with Amateur Radio, it would have much greater circulation by now (it's free!) after 4.5 years of weekly publication.
>
> Thus, from my observations from Zero Retries, I think that you may find your outreach to be more effective by *not* targeting the *same old, same old* Amateur Radio audiences at hamfests, etc. Instead target audiences of techies in the *21st century*, such as:
>
> - Makerspaces
> - Maker Faires
> - STEM classes at high schools
> - Meetups of Meshtastic users
> - Linux user groups
> - Local IEEE meetings
> - Local college / university Amateur Radio clubs
> - Meetings of "techies" Amateur Radio clubs
>
> My personal experience is that some geographic areas just don't have the critical mass of enough curious techies that's necessary for "Zero Retries Interesting" aspects of Amateur Radio to catch on. Count your blessings that your group had the resources and the critical mass to put up a (D)ATV repeater. *Most* areas do not, and that's to the detriment of Amateur Radio.

Starlink Mini - *Wow!*

I received my Starlink Mini a week or so ago and wow, *it is amazing*.

The setup process *only* works if you follow the process *exactly* as outlined on the lid of the Starlink Mini box, which specifies to first place the Starlink Mini outdoors with a clear view of the sky. Only once the Starlink Mini has connected with the Starlink constellation can you proceed with the setup process (see "Starlink" as one of the Wi-Fi options). Then you can do the Wi-Fi setup (renaming the SSID, establishing a password).

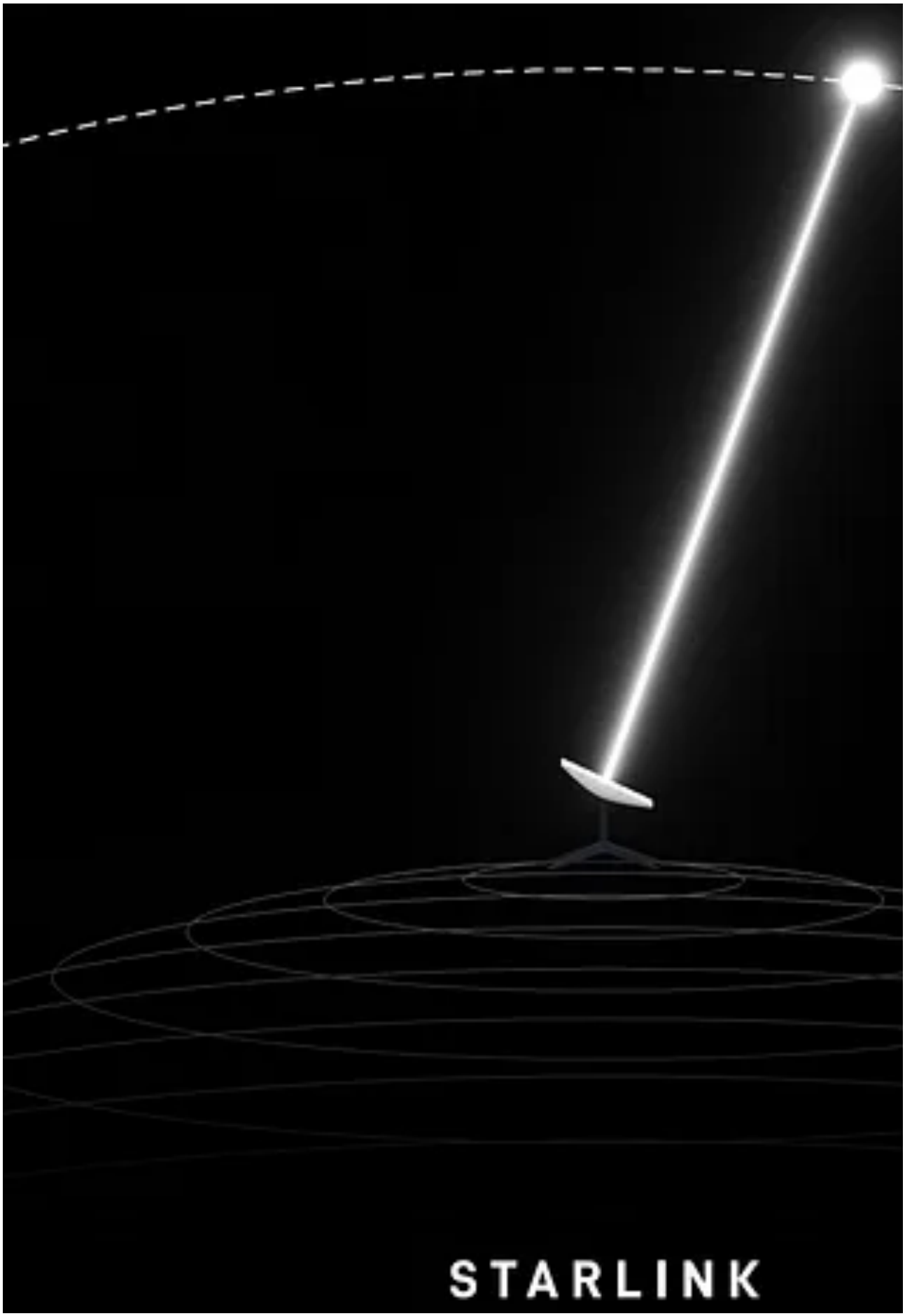
But once you're past that, wow, Starlink Mini works great. Even the "minimal speed" 500 kbps works surprisingly well. I was able to watch (grainy) YouTube, and do all my normal activities quite well, including editing Zero Retries via Substack, which is entirely web-based. (I noted that the transition in the upper left corner status from "Saving changes…" to "Draft" took a few seconds longer, but that was the only difference I could see. Email, looking at web pages, etc. all worked *normally*.

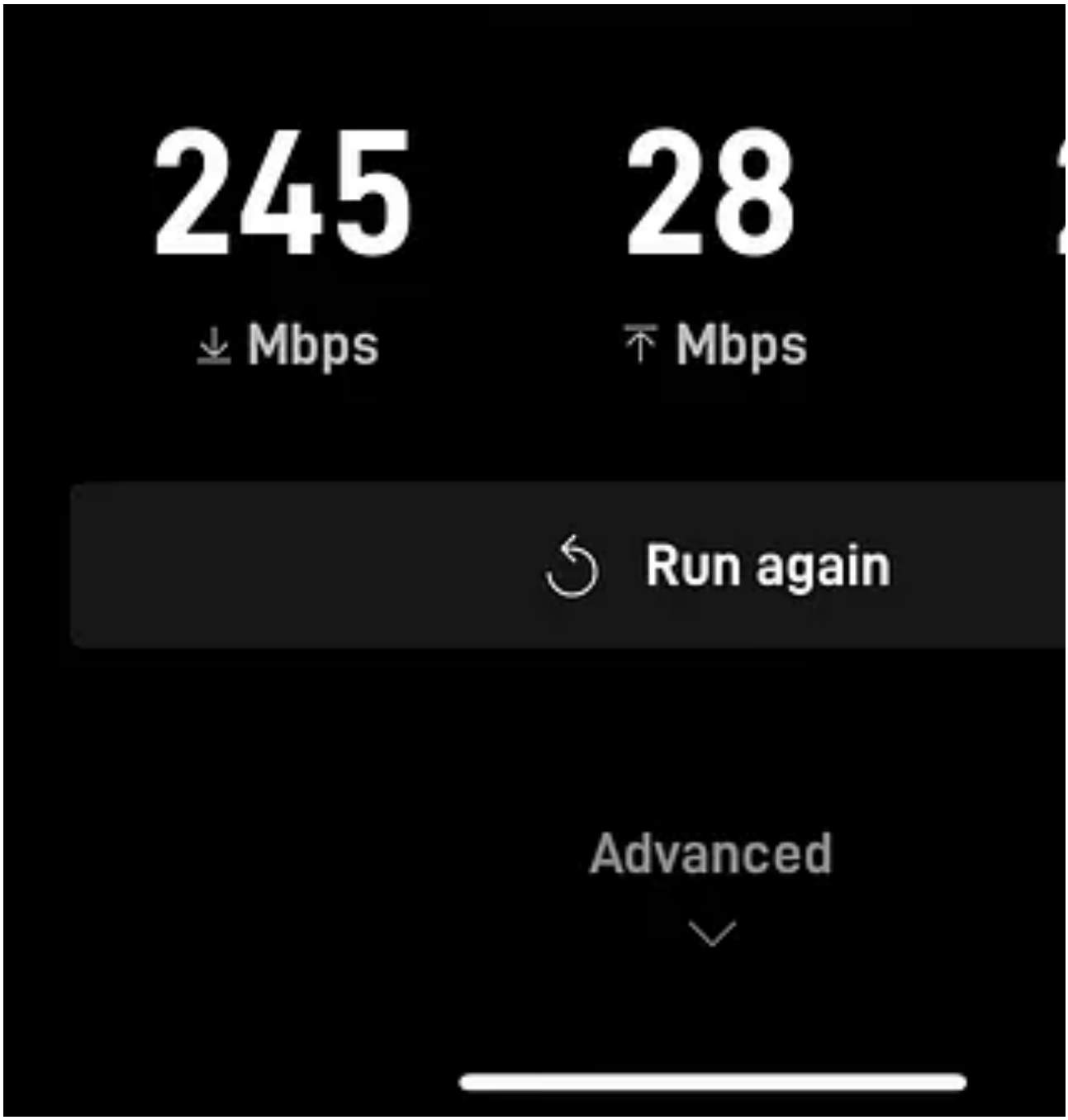
Here's one photo of *just how trivial it is to "set up" Starlink Mini*:

Photo by Steve Stroh N8GNJ 2025-11-16

The orientation of Starlink is NNE and the Starlink app was interactive in saying that was the most optimum orientation.

Here’s the result of the speed test:


STARLINK



Look at that casual “installation” photo again - 245 Mbps down, 28 Mbps up (if I was paying for one of the “normal broadband” tiers of service which, again, is $25 / month for me as an existing Starlink user for my home service.

I suspect that Starlink Mini communications will quickly become another network for techie hobbyist communications, with peer-to-peer encrypted links, audio, VOIP telephony, video streaming (including full time cameras), native IPv6 support, web servers, etc. similar to the techie hobbyists that have embraced Meshtastic and MeshCore and perhaps soon 802.11ah / Wi-Fi HaLow.

The SharkRF m1ke (see below) is an absolute natural for a “Starlink techies network”.

Penguins and LinHT Manufacturers - *No One Wants to go First*

Even though it’s early days with the LinHT project (see first article in ZR > BEACON section), various folks have been reaching out to portable radio manufacturers in China, with no real results. Each manufacturer that’s been contacted is “carefully studying” LinHT, but are totally noncommittal.

Short reason, no radio manufacturer in China wants to spend the money and work to be first with a LinHT unit, only to have their unit quickly cloned by other radio manufacturers in China. That’s just the normal business model in China, little or no legal or other protection of technology, only some unique brand names (and sometimes, not even that’s can be protected).

In emails over the past couple of weeks, I’ve offered the analogy for this situation of penguins[1] queueing up to go dive into an opening in the ice, *knowing*

that there might be a shark or orca waiting for the first penguin to jump in. The penguins start crowding around the opening in the ice, waiting for *one penguin* to get hungry enough, or brave enough, or get pushed into the opening in the ice.

The point being, once one penguin goes, *they all quickly follow*. I was able to find a nice YouTube video to humorously illustrate this point. Thus, like the penguins crowding around a hole in the ice, there will eventually be one radio manufacturer, probably in China, that's hungry enough, or brave enough, to make a LinHT.

And, once one manufacturer starts making a LinHT (and lots of money)… lots of other radio manufacturers "will all go" - just like the penguins do.

We *will* eventually get a plug and play, turnkey LinHT from a significant manufacturer, likely in China. *LinHT is too powerful a concept for it not to happen*.

***Another* Hilariously… Ridiculously Long "Newsletter" This Week**

My editorial composition process for Zero Retries is still (regrettably to me) chaotic. I put in equal parts items that I find interesting, useful, or important. I can't remember the last time the Substack "caution" didn't pop up warning me that an issue was "too long for email". That's when I started adding:

> **On the web: https://www.zeroretries.org/p/zero-retries-0229**
>
> **Substack says "Too long for email"? *YES***

Mentions at the very top of each issue.

The Substack editor has a useful icon labeled **Post info** in the lower left corner, that I almost always never look at. But I was spending so much time paging up and down in composing this issue, I thought "wow, this one's *really* long". So I looked at Post info…

Reading Time ~ ~~1H 22M~~ - 1H 39M *(as I finally cease to add things to this issue)*.

You've been warned 🤣

Update - Even *more* hilariously, that reading estimate was before I accidentally stumbled onto the information about the new lead article in this issue, which was *so Zero Retries Interesting*, I couldn't *not* include it in this already *way too big* issue.

Credit Where Due - Guillaume F4HDK Patiently Created and Nurtured a ~~Good~~ *Great* Idea - With Open Source

In 2019, Guillaume F4HDK unveiled his New Packet Radio (NPR) system (Reference 1, Reference 2). F4HDK developed NPR as a "clean sheet of paper" design and despite including "Packet Radio" it had no backwards compatibility with legacy Amateur Radio Packet Radio, other than "packets" were used, over "radio". No AX.25, no narrow bandwidths, no TNCs, no legacy FM (or other) radios, etc. NPR used TCP/IP, Ethernet as a radio interface, reasonable data speeds (100 kbps - 1 Mbps), on the 420-450 MHz / 70cm band. NPR even had a built-in networking capability for making efficient use of high profile nodes.

But the biggest innovation of New Packet Radio that F4HDK used was that he released NPR as open source, hardware, software, and well-designed protocol. His good designs that could be replicated, and then improved upon, the growing need for such a higher speed data radio for use on VHF / UHF, and his decision to use the open source model, has now resulted, in 2025, of a version of NPR for the 2m band (currently, 146-148 MHz). That one radio could conceivably be the "magic bullet" that helps recreate Amateur Radio data networks suitable for use (and NewTechHams) of the 21st century.

Kudos to F4HDK for his prescient creation of New Packet Radio!

Credit Where Due - ARDC Grants Can Really Work

This issue of Zero Retries has become laughably long and disjointed with a several inter-related and overlapping story threads, but early in this issue, I wanted to make one clear connection about ARDC grants.

This ARDC Grant:

Grant: New Packet Radio Version 3.0 / Seeding UK and Ireland Usage

Resulted in these two (and perhaps eventually three) *new high speed data **radios*** specifically designed for Amateur Radio operation on Amateur Radio VHF / UHF bands:

New Packet Radio NPR-H 3.0 (2m)

New Packet Radio NPR-H 3.0 (70cm)

Going back as far as the TAPR packetRADIO (concept) 30 years ago, Amateur Radio has needed such higher speed, *designed-for-data **radios***, designed specifically for Amateur Radio requirements, especially Amateur Radio VHF / UHF spectrum, *for decades now*.

What finally created *these* new radios was an ARDC grant to fund the non-recurring engineering costs, routed to folks that were *capable and willing to do the work* of creating these *unique radios for Amateur Radio*. Finding such folks to do such work was the marvel - the grant wasn't very lucrative, but it was apparently sufficient for Localino to do the work in creating these new, unique Amateur Radio data radios.

Thus, kudos to:

- Online Amateur Radio Community (OARC) for the vision to request the grant,
- ARDC for funding the grant,
- Localino for creating these two new radios.

ARDC grants for research and development *can* work. Sometimes ARDC's research and development grants *don't work out*2. That's the nature of Research and Development.

But when a Research and Development grant *does* work, like this grant, it can really make a profound difference in Amateur Radio.

Weekends Are For Amateur Radio!

This weekend's primary Amateur Radio activity will be devoted to playing with the m1ke that SharkRF has sent me for review. I first mentioned the m1ke in a (admittedly gushing) article in **Zero Retries 0179** - SharkRF M1KE. That was a full year ago, so SharkRF has had plenty of time to work out the bugs from this unit, and I'm looking forward to easily participating in some Internet talk groups, as long as they're ones that the m1ke supports (the list is *long*). One demerit I'll be offering is that M17 isn't on SharkRF's list of compatible networks - *bummer*. Although… *maybe*… Brandmeister is a supported network, and (I think) Brandmeister supports M17?

Minor disclaimer - The multiplicity of options of Internet talk groups is a bewildering array of choices that I've not previously dived into. It's going to take me at least a couple of days to really wrap my head around all of this. Fortunately, Tom Salzer KJ7T in ***Random Wire Newsletter 157*** *saved me a great deal of fumbling with the m1ke in his storylet Beginners guide video from M0FXB.*

While I didn't come out and say it in my initial mention of the m1ke, it is an interesting and potentially useful device that it went on my "buy one, someday" queue, but to date, I had not yet done so. Thus I was delighted when Norbert Varga HA2NON of SharkRF offered to send me a m1ke for review.

I have to get it working in time for the US Thanksgiving holiday on Thursday 2025-11-27 when there will be some additional Amateur Radio Operators in our household that I'm sure would be interested in playing with it.

Things I'm very interested in exploring with the m1ke beyond the usual Internet talk groups are:

- Direct communication with other M1KE devices (no internet connection or wireless infrastructure needed).
- Multicast communication with other M1KE devices over the connected wireless network.
- Custom private networks (built-in support for broadcast/multicast gateway operation and site linking over the internet).
- Custom private servers (SharkRF IP Connector).

And, hopefully, communicate via Amateur Radio Over Internet with my buddy Tom Salzer KJ7T who also has a shiny new m1ke for review. I'll definitely be using it over the new Starlink Mini. The m1ke is *really cool* - likely a full review in **Zero Retries 0230** next week.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Next week, **Happy Thanksgiving** to all you Zero Retries readers in the US. ***Tina and I are thankful to all of you*** for subscribing, reading, commenting, and especially supporting (financial, and otherwise) the Zero Retries newsletter, the Zero Retries Digital Conference, and all the other Zero Retries activities.

Steve N8GNJ

Leave a comment

Share

(Breaking!) Plug and Play New Packet Radio Units Available from Localino… Including for 2 Meters!

By Steve Stroh N8GNJ

OK5VAS - The New Packet Radio

As part of my article on the updates for the LinHT Project (see ZR > BEACON section), I found a mention of an interesting project to develop a new version of the New Packet Radio modem by (LinHT hardware developer) Vlastimil Slinták OK5VAS called The New Packet Radio. This article is dated 2025-06-25, but despite looking at OK5VAS' website in the past couple of months, I hadn't seen that specific article because that article is only in Czech, and I had been clicking the UK/US button to see articles in English. But, as I was putting the finishing touches on this issue, I saw it and was impressed. Probably because the page is partially in English (the sidebar), my primary browser (Apple Safari) didn't offer an automatic translation. But Firefox did, and I read with interest.

> In this text, I would like to introduce the **New Packet Radio project** to the Czech-Slovak amateur radio community (and also the Hamnet network a little marginally) and why I was so interested that after years I decided to get a license, design my own PCB and start experimenting with NPR.
>
> In the text we will look at the history, technical parameters and practical use of NPR and hopefully I will be able to motivate you so much that together we will expand the NPR in the Czech Republic/SR. Well, let's do this.
>
> When I finally started thinking about a radio amateur license this year, it was mainly because of digital modes and HAM data networks. I was never very attracted to talking to strangers on short waves as an introvert (even if this changes over time, I recently discovered the M17 mode).
>
> I like that instead of a voice connection, modern radio amateurs use digital/data transmissions, often with admirable efficiency in limited bandwidth. But most of the available modes (AX.25, APRS, FT8, ...) are built to very low bitrate, often only to transmit a few bytes of text per minute.

> Then there is the (so far little-known and widespread) NPR project, which aims to create an **open, IP-compatible and high-speed radio network** for radio amateurs. It is not a black box full of patents – it is a fully open-source solution built on commonly available components and open firmware, authored by **the French radio amateur F4HDK**. I was very interested in this and as someone who studied telecommunications at BUT FEKT and professionally deals with the development for IoT, I was really interested in the combination of simplicity, openness and the chosen technical solution.
>
> For a moment I read about NPR and watched all available Youtube videos, went through the original documentation, clicked on the firmware, and then put it aside for a few months. It was not until I was provoked by Twitter in February this year by a post from OK2AWO, which boasted the first planned Hamnet connection in the Czech Republic.
>
> We started talking and there was a mention of NPR. This time I didn't hesitate, launched KiCAD and started designing my own version of the album. I wanted to get everything on one compact printed circuit board, without unnecessary cables and purchased PCB modules, ready for use. I used the radio module from NiceRF (as well as the original author), but I composed the rest of the circuit from separate components, liabilities of size SMD 0402 and everything as compact as possible.

Other New Packet Radio Variants

Since OK5VAS was new to New Packet Radio (at the time of that article), and I had corresponded with him lately about the LinHT project, I thought he might like to know about some other New Packet Radio development to improve the original NPR hardware design, including:

- NPR-70 v05 Modem by F4HDK | New Packet Radio over 70cm Band | Amateur Radio Packet Radio | Factory-Assembled
- New Packet Radio Modem Version 2, NPR-H 2.0
- TACNPR - Another Independent Implementation of New Packet Radio
- Grant: New Packet Radio Version 3.0 / Seeding UK and Ireland Usage

Then It Really Got Interesting

As I was web searching to find that first link in the previous paragraph (I couldn't remember the name of the "storefront" site Tindie)…

I found the **Localino Ham Radio page**.

And, there were two *new* New Packet Radio variants mentioned in the ARDC grant linked in the previous paragraph:

New Packet Radio NPR-H 3.0 (2m)

New Packet Radio NPR-H 3.0 (70cm)

There will be a third radio unit - **New Packet Radio NPR-H 3.0 (23cm)** but that won't be available until mid-December at the earliest.

What's brilliant about these three radios is that they have a common "compute" motherboard, and the individual radio boards just plug in to the motherboard. Thus they have a common enclosure, end panels, etc.

> **What is new in Version 3.0?**
>
> - Modular design for 70cm, 2m and 23cm RF NPR-H 3.0 boards (baseband board + selectable RF board)
> - New Microcontroller STM32F4 with more power
> - Ported and updated firmware with bugfixes and improvements (USB bootloader for [firmware] updates, watchdog, listen before talk feature, interrupt handling, fixed race conditions)
> - Compatible with F4HDK firmware/master/client nodes

These are built-for-purpose higher speed data *radios*!

Just in case the point is lost with this development, perhaps the lede got buried in my excited verbiage… these are new *data radios* that can do, natively, up to 1 Mbps on the 2m and 70cm (and probably, eventually, the 23cm) band.

Ethernet (and USB-C?) data in, RF out, and unlike the original New Packet Radio (that was only available for 70cm), the output power is a very usable *7 watts*.

To address the but, *but*, ***but*** factors…

- The use case for New Packet Radio, and these units, is a lower speed (but still reasonably fast), longer range connection into the European HAMNET high speed microwave network using VHF / UHF bands. (But there's nothing restricting these radios to that usage.)
- Yes, the 2m unit is designed for the Europe 2m band (146-148 MHz, but I confirmed with Steffen Heuel DO5DSH of Localino that it will work over the full 144-148 MHz 2m band available in North America.
- There will likely be issues using the 2m unit in the US with the current FCC Part 97 bandwidth limit for 2m of 20 kHz. (More on this in a bit.)
- Despite the ongoing tariff issues with the US, Localino will happily sell and ship these units to the US.
- The units are sold as boards, but can be supplied with enclosures (German Fischer AKG series) for an additional €19 including front and back plates.

What's really encouraging is that New Packet Radio was developed entirely with an Amateur Radio use case:

- NPR uses Amateur Radio callsigns for node identifiers.
- NPR uses IPv4 TCP/IP addresses. Fortunately, there's no need for using IPv4 Network Address Translation (NAT) - 10.x.x.x, 192.168.x.x, etc. We in Amateur Radio have a pool of routable, unique IPv4 addresses to work with - 44Net so we can build "clean" networks using these units using IPv43 TCP/IP.
- NPR uses native TCP/IP - it's basically Ethernet / RF bridges. Just use your usual TCP/IP apps - email, web server and browser, file transfers, etc.
- NPR has provisions for high profile nodes to efficiently manage contention for multiple stations accessing a high profile node.
- I'll guess there's some easy way to bridge or route multiple NPR LANs - different 2m or 70cm channels, cross-band, etc.
- For North America, the (not quite homogenous) equivalent role of Europe's HAMNET is networks based on AREDN. While HAMNET has the advantage of population density (and thus infrastructure is more supportable), AREDN has the advantage of being able to easily form local networks with mesh networking (or static networking), with tunneling between AREDN LANs via Internet. These new NPR radios could easily (I hope) fit into AREDN networks in the same way that 802.11ah / Wi-Fi HaLow units have been integrated into AREDN.

Suffice it to say, *for now,* that these new New Packet Radio units are a very big, very exciting, very promising deal for Amateur Radio data communications and may well be the building blocks of a new Amateur Radio high speed data communications network in the 21st century.

I will be reporting on these new radios very regularly from how on here in Zero Retries. It seems quite likely that if these new radios are actually able to be delivered to the US, I'm going to get a pair of each on order for testing in N8GNJ / Zero Retries Labs.

Pushing the Boundaries of US Part 97

These new Localino radios are hardware refinements that don't change one fundamental aspect of New Packet Radio - the minimum bandwidth is 100 kHz.

In the US, a 100 kHz bandwidth is incompatible with the current Part 97 maximum bandwidth limit for data modes in the 144-148 MHz 2 meter band of 20 kHz.

In the US, a 100 kHz bandwidth is *barely* compatible (slowest setting) with the current Part 97 maximum bandwidth limit for data modes in the 420-450 MHz 70cm band of 100 kHz.

In the US, there are no bandwidth limits on the 1240-1300 MHz 23 cm band so the NPR-H 3.0 (23cm) can be used in the US with no restrictions.

To use an NPR-H 3.0 (2m) / (70cm) to its full potential of 1 Mbps, requires a bandwidth of 1 MHz. Thus to use the New Packet Radio NPR-H 3.0 (2m) at all in the US, or to use either unit to their full potential, requires regulatory change.

We have three potential solutions:

1. Petition the FCC to *delete data communications bandwidth limits* on the US Amateur Radio VHF / UHF bands per the recommendations of the ARRL and others (including me). (I'll put together a full re-hash of the comments filed with the FCC to date for future reference and new filings with the FCC.)

   There are ample "protections" available in other parts of Part 97 to ensure that interference is minimized. For example, the NPR-H 3.0 (2m) probably isn't a good fit for operation in US urban areas where there are numerous 2m voice repeaters, thus not "Good Amateur Practice".

   This is the long term solution, but will require a significant, coordinated effort.

   This comment / observation by Justin Overfelt AB3E from Zero Retries 0223 is **now completely applicable**:

   *…Interesting statement from ~~Commissioner~~ [actually, **Chairman**] Carr:*

   https://docs.fcc.gov/public/attachments/FCC-25-68A1.pdf

   He says that soon they'll move to "more substantiative whacks at the FCC rulebook". I think these will take the form of NPRMs rather than direct final rules and in fact one has already come out regarding Internet labeling regulations that is generating some new comments. Some things to realize here:
   ** They are very obviously only doing deletions. I felt this was clear from the jump, but that didn't stop people from requesting all sorts of massive new regulations.*
   ** With that in mind, it might be worthwhile to comment again emphasizing the changes for Part 97 that can be accomplished with only deletions (symbol rate, 219, etc).*
   ** The takeaway is they are tracking (to the word level) how many regs they delete so adding to the pile of removals will get consideration.*

   Thus, perhaps now, with the use case of these new NPR radios to illustrate the need and utility, carefully craft and submit a new *Notice of Proposed Rulemaking* to the FCC to surgically delete the bandwidth limitation statements (and of course, the inane symbol rate limitations) for the Amateur Radio VHF / UHF bands. That approach would seem to stand a reasonable chance of being paid attention to by the current FCC administration.

2. File an application with the FCC for a Special Temporary Authority (STA) to prove out the potential utility and full potential (1 Mbps links / networks) on VHF / UHF bands) of the NPR-H 3.0 (2m) and NPR-H 3.0 (70cm). The problem with an STA is that it's temporary… of limited duration. However, this might be expedient and necessary precursor to requesting removal of bandwidth limits for VHF / UHF in Part 97. Elements of an STA:

   1. Manage the STA carefully, with a central Point of Contact (POC), who can easily contact all participants.
   2. An STA will require a plan on what is to be tested / demonstrated, a viable number of participants (willing to invest in the equipment to be

tested / demonstrated).

3. Ideally there will be some geographic diversity of the STA activity, especially use in rural areas where Amateur Radio spectrum usage is lower.

4. At the end of the STA period, compose and submit a final report to the FCC on the results of the STA.

   Also document in that final report that there are no bandwidth limits imposed on Amateur Radio VHF / UHF bands in other countries (notably, Canada) without detrimental effect to Amateur Radio operations in those other countries. Also note that Amateur Radio bands are smaller in those countries, most notably in Europe, only 2 MHz on 2m, and 10 MHz on 70cm is available for use by Amateur Radio.

5. Demonstrate use cases for the faster data rate and unique applicability of high speed data communications on the VHF / UHF bands such as longer and not necessarily optical line of sight paths, easier antennas (than microwave - 5 GHz).

6. Demonstrate that with careful planning (such as point to point) there are not significant interference issues resulting from 100 kHz - 1 MHz bandwidth usage on 2m and 70cm, especially in rural areas.

7. Demonstrate that Amateur Radio with the use of VHF / UHF high speed data radios is improving the state of the radio art, when data communications have largely been moved to microwave networks and commercial mobile networks, Amateur Radio can do high speed data communications in VHF / UHF bands.

3. In lieu of an STA, file an application with the FCC for a Part 5 Experimental License to prove out the potential utility and full potential (1 Mbps links / networks) on VHF / UHF bands) of the NPR-H 3.0 (2m) and NPR-H 3.0 (70cm). Note that while the FCC states that the usage for Part 5 licenses are "… for space and earth station licenses…", the FCC has issued a number of Part 5 Experimental Licenses for experiments with HF systems, so this statement doesn't seem like a "hard" rule for Part 5 Experimental Licenses. The same elements of an STA apply to a Part 5 Experimental License, with the desired result to demonstrate the feasibility of removal of bandwidth limits on the US Amateur Radio VHF / UHF bands.

Thanks to the pioneering work of F4HDK in 2019, then OARC and ARDC in 2024, and Localino in 2025, we *finally* have **high speed data *radios*** created for the unique aspects of *Amateur Radio* for the *VHF / UHF bands*… that we have wanted for literally three decades now.

What remains now is to persuade the FCC to minimally update the Part 97 rules to eliminate the arcane bandwidth restrictions on the US Amateur Radio VHF UHF bands… for groups to buy and deploy the radios, and start finally having fun with *fast data communications over radio*. DreamNet indeed!

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The Piling On and Misinformation About ARDC Continues

By Steve Stroh N8GNJ

*I now feel a bit prescient about my article in **Zero Retries 0228** - In Defense of ARDC and its Grant Funding / Process.*

In a Forums post on **QRZ.com** by Kevin Thomas W1DED - Call for Volunteers: Help ARDC Shape Ham Radio's Future, a video on the YouTube channel, **Q5 Worldwide Ham Radio**:

With this description (on YouTube):

> Chelsea Párraga KF0FVJ and John Burwell KI5QKX are calling on the amateur radio community to step up. Representing Amateur Radio Digital Communications (ARDC), they're actively recruiting new volunteers to help drive the next wave of innovation, education, and technical stewardship in ham radio. Whether you're a seasoned operator, an open-source developer, an educator, or simply someone eager to give back—this is your chance to shape the future.

> ARDC is a private foundation funding $3–4 million in grants each year—supporting everything from school station buildouts to open-source software development. But money is just part of the picture. The engine behind ARDC's success is its dedicated volunteers. Chelsea and John describe a wide range of roles now open: from grant reviewers to results evaluators to science communicators. There's also critical work to be done within the 44Net IP address space—protecting resources, advising on technical development, and building community.
>
> If you've ever wanted to make a difference in ham radio, now's the time. Apply at www.ardc.net. The commitment varies—from an hour a week to five—so there's room for all kinds of contributors. The term? One year, with options to stay longer if you're making an impact. The need is real. The door is open. Get involved. Application Deadline is October 31st so act quickly!
>
> Go to this link: https://www.ardc.net/join-ardcs-2026-volunteer-team/

While there were some reasonable and clueful commenters participating in the discussion, some… *less enlightened* … commenters "contributed", such as:

> … the people named in this post, Chelsea Párraga KF0FVJ and John Burwell KI5QKX, are only Technician Class hams. They have a very limited spectrum in which to operate. If they are truly innovative for Amateur Radio, why after being licensed for many years have, they not been able to pass to General or Extra class by now? Let that sink in...

Very limited[4] *spectrum?* The implication being that licensed to use, and operating on HF is… *the big deal about Amateur Radio*? There's more "spectrum" in the US 70 cm / 420-450 MHz band (30 MHz!) than *all of the HF bands* (3-30 MHz) - and *as Technicians, KF0FVJ and KI5QKX have* ***full*** *access to that band*.

And we wonder, with lots of hand-wringing why many Amateur Radio Technician class Amateur Radio Operators don't find Amateur Radio particularly interesting after interactions like this on forums, contacts on the air, and encounters at Amateur Radio club meetings?

Um, ***no****, HF is not "the big deal" about Amateur Radio… in the 21st century.*

That one statement represents well the vast void between legacy Amateur Radio and Amateur Radio of the 21st century. I count ARDC as an organization of the latter[5] given its focus on funding Research and Development for Amateur Radio and related fields. I also count Zero Retries as representing Amateur Radio of the 21st century.

I encourage Zero Retries readers (with more time and patience than I have on this issue) to read the thread and comment.

Leave a comment

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The 44Net Story - Q5 Worldwide Ham Radio Interview - Inside ARDC: Bdale KB0G on Funding the Future of Ham Radio

By Steve Stroh N8GNJ

Kevin Thomas, W1DED did this interview with Bdale Garbee KB0G, the President of ARDC on 2025-04-30. I had bookmarked it to watch, but as things go sometimes in my Zero Retries Interesting queue, it kept getting pushed down, and I probably lost track of it due to the upcoming Hamvention 2025. In researching the previous story, it surfaced again and I watched it, and quickly impressed with the detail and background presented by KB0G.

I've known KB0G for a very long time, mostly by reputation from his work with Phil Karn KA9Q (of KA9Q Net / NOS fame) and Mike Cheponis K6THZ (then K3MC of KISS protocol / hack for TNCs) to make TCP/IP over Amateur Radio usable. I first met KB0G (then N3EUA) at the 8th Computer Networking Conference in 1989 in Colorado Springs, Colorado. I've been an unabashed techie fan of KG0G, K6THZ, and KA9Q since those early days of Amateur Radio TCP/IP. I also need to mention KB0G's prescient and inspirational column in the TAPR Packet Status Register (PSR) newsletter titled Bits in the Basement. Not only was he using TCP/IP as a hobbyist, he was using Ethernet (gasp!) and UNIX (double gasp!) in his basement, in that era… and I was fascinated by the ideas and the projects he described in his column.

There's a lot of Zero Retries Interesting details, history, and context in this interview and the unique (and pretty Zero Retries Interesting) perspective of KB0G. Candidly, in my opinion, KB0G makes more of a "case" for ARDC's grant making, and Amateur Radio's relevance in the 21st century, than most of the other promotions of ARDC such as "we make grants for Amateur Radio!"

Thus I decided to republish the transcript generated by YouTube as an option to watch / listen to the 48 minute interview, and it will eventually be easier to find this info with the text information "published in the open". I "curated" (mostly, formatting, some punctuation, etc.) the raw YouTube transcript. The subheadings were supplied by the YouTube transcript. The parsing of paragraphs, and putting W1DED's statements in italics was me. I didn't take the time to correct all the capitalization issues.

Hi, my name is Kevin Thomas, W1DED. Today I am with Bdale Garbee. Bdale is the President of Amateur Radio Digital Communications. ARDC is a private foundation that is charged, in general, with supporting and growing ham radio through innovation via a variety of different means. They, fortunately for ham radio, grant about $5 million a year to various organizations. They're the most significant funder of ham radio in the US today. I'm very excited to talk to Bdale today and to understand more about the ARDC. Bdale, thank you for joining me.

Yeah, good morning Kevin. I'm happy to be here.

Bdale's ham radio background

So I want to dive into the ARDC, but it would be a shame not to understand a little bit about your ham radio background.

I know your call sign is KB0G. Tell me about that. When did you get licensed?

I first got licensed while I was a university student in the mid eighties. A good friend Mike Cheponis K3MC finally got me over the hurdle of getting a license. I started with an old school novice license and did the upgrade to technician. My first callsign as a novice was KA3ORU, and then I became N3EUA - hard to say and not all that exciting on the air - as a technician.

It wasn't until after I had moved to Colorado and gone to work for Hewlett Packard sometime later, that I took advantage of one of the first changes in the licensing stuff to become one of the first, what I call slow code Extras. I did all the written exams and got credit for my existing five word per minute that I'd passed as a novice and became KB0G then. So the zero is reflective of being in Colorado and really wanting to have a zero call, I always thought that was kind of a cool thing. That's pretty much how the licensing thing happened.

In terms of things I've been involved in, unlike many of your guests, I don't spend a heck of a lot of time on HF. I enjoy dabbling from time to time, but my initial interest, the thing that finally got me over the hurdle to get a ham license was the emergence of packet radio and the excitement I saw personally in being able to engage in computer oriented communication over ham radio links. And then I got really interested in VHF and microwave weak signal stuff, and I used to go roving a lot in things like the August UHF and the various VHF contests. I did at one time hold the record for the highest score as a rover in the August UHF contest in the Rocky Mountain region. I was one end of some distance record setting attempts on microwave. It helps to have a 14,000 foot mountain just to the west of where I live near Colorado Springs to use as one end of microwave communications distance attempts like that.

And then over time, I think I probably am best known in the amateur radio world for some combination of helping to make Phil Karn KA9Q's TCP IP software work well for folks in amateur radio and elsewhere, and also for my contributions over the years helping to design and build pieces of amateur radio satellites. So with all that, there's clearly an intersection with where the ARDC began.

The beginnings of ARDC

So why don't we segue right into that. What was the beginnings of the ARDC? Tell us that story.

So when the ARPANET (Advanced Research Projects Agency Network) was an ongoing research project and before it really became the internet, we got to the point in history where the current internet protocol version for address format came into use. And in the old days, they assigned addresses on that net in blocks, and there happened to be some interested ham radio folks who were aware of what was happening with the emergence of this protocol set and thought it would be fun to play with it some over ham radio. And so they went to the powers that be and asked for a block of addresses for use by ham radio people potentially worldwide and sort of in an indication of how different the world was then the responsible parties assigned amateur radio all of network 44. Which means internet protocol addresses version four are 32 bit addresses.

So it's basically here's the first eight bits or 44, and then you've got 24 bits to play with. Two to the 24th is like 16.8 million addresses. And so all of a sudden ham radio had a whole bunch of numbers at that point in history. Nobody I think dreamed that those numbers would ever have any financial value. They were just...you had to have a unique one in order to play on the network.

And ham radio was a big enough potential consumer of interesting or producer of interesting ideas we might consume some addresses over time. The powers that be thought giving us that Class A address block was a good plan. Roll forward in time and that had not been assigned to a corporation or anything like that. It was just sort of set aside for ham radio. And when people started to realize that a 32 bit address space was not infinite and we were eventually going to run out of addresses, and there was a perception that, oh, that means addresses might get valuable, the powers that be suggested that the loosely organized group of ham radio people who were playing with those addresses might want to actually form some kind of an entity to be the legal holder of those addresses and prevent them from just being snagged at some point.

And so that was when our founder, Brian Kantor WB6CYT, formed Amateur Radio Digital Communications (ARDC), and it was set up initially as an IRS recognized 501c3 nonprofit organization running its public charity, had essentially no money but had this asset, which was a block of internet protocol addresses. And over time, those addresses got to be really valuable. And so by the time we get to 2019, which was a long time from the eighties when we first started playing with this stuff, Brian and others recognized that there might actually be more value to the ham radio community overall if we were to take some portion of those addresses and turn them from being an asset consisting of a bunch of numbers into being an asset that was consisting of a bunch of money.

And so the decision was taken to convert a quarter of that 16.8 million address space into something that would be offered commercially. And ultimately a well-known internet services company chose to buy that. And I believe at the time it was the largest dollar figure paid per address for a large address block. And to sort of cut to the chase, when that whole transaction was done, the organization's net proceeds from that sale were approximately $109 million. So all of a sudden we went from maybe a couple hundred bucks in the bank that people had donated to help make the organization be able to exist to, oh my, that's a lot of money. We all have this desire to see it do great things for ham radio. Now what do we do? And that's about the time I joined the board.

I had been involved in the whole experiment of working with TCP/IP protocols on ham radio almost from the beginning when I first met Phil Karn at the first ever meeting in the Mid-Atlantic Packet Radio Council. And he and I and Mike Cheponis and Bob Hoffman were the four initial founders of the mailing list called TCP Group, which is the predecessor to today's 44Net mailing list community. And up until April of 1989, I served as the sort of chief tester and documentation person for Phil's KA9Q TCP IP package. And so through that whole period of time, I had been somehow involved in these things. I had helped Brian from time to time when he was trying to figure out how to deal with the internet powers that be and sort of keep everybody calm and keep things working. And so I had been asked for several years if I would be willing to join the board of directors and take an official role with the organization. And honestly, there were enough other things going on in my life that wasn't really a priority for me until all of a sudden the transaction happened and I looked and said, oh my, it's really, really important that the right things are done with that money and that this doesn't somehow end up being a mess.

And so at that point, I agreed to join the board, and that happened in the fall of 2019. Well, certainly a remarkable story and fortuitous for ham radio.

The early hams

And I guess I'm curious who were those early hams that set aside those IP addresses so we can say thank you to them?

Yeah, the person whose name I know the best is Hank Magnuski. Hank actually served on our Grants Advisory committee when we were first setting up the granting program. There were a bunch of other folks, and I'm unfortunately not good at just rattling off names like that. Phil Karn was certainly in the middle of it relatively early because of his interest in developing software which would allow him to actually use these protocols over packet radio.

I remember that one of the key enabling moments was when Mike Cheponis wrote replacement firmware for the early TAPR TNC-2 (Tucson Amateur Packet RadioTerminal Node Controller 2) to allow it to run a protocol called KISS, which yes, really meant keep it simple, stupid. It was a serial line protocol so we could push IP frames through TNCs, which of course the standard firmware for those was intended to be used entirely differently. I was one end of the first TCP IP connection over amateur radio, radio using a KISS TNC with Andrew Freeborn N0CCZ at the other end of the connection

in Colorado Springs. Andy served for a time as the president of TAPR. He was a fascinating guy and had a real influence on me. I miss him from time to time. Lots of other people along the way.

We could name drop all morning, but I'm sure you have other things we could talk about too.

The evolution of ARDC

So tell me about that progression from that morning when you wake up as the ARDC and realize you have $109 million worth of assets to where we are today, what was the evolution of ARDC? How did you get your footing and what did you start doing early on and how has that evolved over time?

Well, I think Brian Kantor had this notion as our founder of the organization, he had this notion that there are really two important things to do with that money. One was to sort of preserve and maintain the ability of hams to be able to use Network 44 and find more new and exciting things to do with it. And so that's continued to be one of the ongoing programs that ARDC engages in, is sort of maintaining and caring for the resources that are part of making that network useful to hams all over the world. And then the second big thing was, hey, if we had money we could gift and grant it to people who had great ideas.

I remember, Kevin, and I think it was 1989, we held one of the ARRL TAPR Digital Communications conferences at the US Air Force Academy just north of Colorado Springs. And in fact, Andy Freeborn, who I mentioned a few minutes ago, was the one who was sort of the lead organizer of that event. And I got roped into ringleading a discussion on Sunday morning. We often had sort of tutorials or other topics on the Sunday after the conference was mostly over and the topic was sort of an open discussion about something we ended up calling DreamNet, which was this notion of if we could do anything we wanted with Packet Radio, what was it we wanted to do?

And if you think back to 1989, for those of us who were around then that's before the internet was a thing that everybody had access to. It was before most people had cell phones. In fact, before a whole lot of folks really knew what they were. And so at that point in history, we had this grandiose vision of if we could just sort of have a digitally connected thing in our hand, there's all this cool stuff we could do.

And I think what we were envisioning was kind of what today people see and think about when they pick up a smartphone and they've got the internet and they can look things up and they can video call with people and they can do things like we're doing right now. At that time, that was sort of crazy visionary stuff. And one of the sad realizations we had is [that] we couldn't afford to do it. Nobody had money. We all understood that if you were a serious HF contester for example, you'd be willing to spend some number of thousands of dollars even in 1989 putting together a killer station to be able to go participate in contests and get great scores and have fun. But that was an investment you're willing to make in your own equipment. When we sort of looked around and said, now who's going to put up the money to build mountaintop repeaters so that I can talk from Colorado Springs to, I don't know, San Francisco, we were all left scratching our heads.

And so it was simultaneously a really invigorating conversation and deeply depressing. And so part of what I think was exciting to me about ARDC all of a sudden having a bunch of money was the realization that and many other ideas that people had had over the years where it was like, there's this great idea, but how could we ever do that? We'll never have the money to be able to do that. All of a sudden maybe the answer could be, yeah, you could get the money to do that. And so then the really difficult part, honestly, as Phil Karn has often pointed out, people just have no idea how hard it is to give away money, particularly if you insist on doing it responsibly and trying to make a difference in the world.

Grant review vetting approval process

Jumping into that process, I'm curious how the grant review, vetting, approval process works and again, how has that evolved over time?

Well, one of the things we realized very early on, and this was something that Brian also understood, was that this couldn't just be one or two people sitting there with a checkbook and making decisions. That wasn't responsible. It wasn't the right thing to do. It's really sad that before we actually got any of this stuff going that Brian passed away unexpectedly in late 2019. And to be honest with you, the rest of us on the board at that time found ourselves sort of in a deep dive scramble to figure out how to pick up the pieces and carry on. And we made some decisions very early. One of them was that we needed help. And so one of the very first things we did was to hire an executive director (Rosy Schechter KJ7RYV), somebody who could sort of take responsibility for running whatever it is we came up with.

And then the next thing we sort of made conscious decisions on was that running some kind of a granting process was going to require some kind of a volunteer community to help us parse proposals and make good decisions. And so through a process of hiring some additional people over time and formalizing some of these volunteer committees, we've ended up with a situation where we sort of run quarterly granting windows where we invite people to send us proposals. We have a fair amount of information on our website explaining how to go about doing that and what a good proposal should look like.

We have a Director of Grantmaking, Chelsea Párraga KF0FVJ, who is just absolutely amazing at running that process for us. And so people will submit proposals, they get a first pass vetting by our staff, our paid staff, to look for things like are these even reasonable to have volunteers spend time reviewing? Do they meet a certain set of minimal criteria for being acceptable proposals?

Then they go to an all volunteer grants advisory committee and they go through all the proposals, they review them, they discuss them. We have a software system that we've actually spent money developing and improving that we use to capture all of that information and build sort of help the advisory team in their collation of opinions to form sort of for each granting interval, here's the things that are obvious we should just say yes to. So here's a block of things that the board will just say yes to. And then there are things that don't make the cut line, but maybe the board of directors wants to look at those and maybe lift something up out of the dust bin.

And then the ones that the board spends the most time on are the ones that are kind of around that cusp line. They're either proposals that are a large enough amount of money that we feel an extra responsibility to ensure that those decisions have all hands on deck as we're making them, or they in some way represent a controversial position or something like that. Or where somebody on the board is perceived as maybe having some unique technical knowledge to bring to an analysis. And so the process is that the grants come in. Staff takes a quick look at 'em. The Grants advisory committee does the hard work of reviewing all of them and sort of rank ordering them and putting them into accept, discuss, and reject buckets. And then the board of directors sort of has the final responsibility as the people with fiduciary responsibility to the organization to yay or nay that quarter's proposed actions.

And once the board approves the grants, they're going to approve, the money gets dispersed and off we go there. Of course, there are a bunch of details along the way before we actually disperse the money. There's sort of contract terms to be accepted. That's sort of a requirement of making this stuff work well and keeping everything legal. But for a small grant to a ham radio club to replace a repeater that took damage in a hurricane or something, those terms are really simple. If you're proposing a multimillion dollar research and development program in a university, you will not be surprised to get a more complicated contract.

Grant categories

So in the buildup to this conversation, I obviously talked to some people and did some research and it seemed to me there were four broad categories of grants and I just want to run them by, you can tell me if I've got it right or not. But one seemed to be the growth of ham radio, a lot of it via clubs and organizations. Another was scholarships, another was education, and another was technical. Are those basically the four categories that you're providing funding for?

That's certainly one way you could slice the data. And I think that makes pretty good sense. It sort of depends on how you define boundaries. Growth of ham radio, there are a bunch of things that we do that are supporting clubs, and most of that is really about growing and preserving what we think of as ham radio today. And so I guess all of those things do sort of fit, could be aligned in that category. It's been sort of interesting. We've run some experiments over time when we were first getting started and we're trying to struggle to figure out how we're ever going to give away enough money to meet the IRS requirements. There was a time when grant proposals that weren't immediately clearly obviously well aligned with our mission might have been said yes to sort of experiment and see what benefit could be achieved.

And we've learned a lot over time. We are really fortunate that we've had an incredibly low failure rate of projects that were funded by the organization. I think we've now had something like, I think we've done something like 315 total grants to date, representing about $30 million in 2024. I think we funded something like 59 proposals at around $3.9 million. And of that 300 plus proposals, I think we've had a total of six, didn't get to the point of filing sort of an acceptable final report, which if you do the quick math means that's less than a 2% failure rate, which is kind of amazing, honestly. One of the things that we instituted about a year ago was a new all volunteer committee called the Grants evaluation team. And what they did in their first year was basically look at all of the grants we'd made so far, at least a bunch of them, and try to analyze where was the most bang for the buck, what kinds of proposals generated more good for the world than others?

And we learned a few things from that, but there's a lot more to learn. I'm really looking forward to seeing what that team does for us this year as well. But all of those things, all these learnings and sort of observation of the results of the various experiments we've tried to run in the granting process, get fed back and hopefully make us better at making good decisions in the future.

Success and failure

Well, certainly just the fact that you're tracking success and failure and you have a grants evaluation committee tells me that you're a very professionally run organization. So kudos to you for that. I appreciate that. I guess one of the things that I had like to understand better, and I don't want to get into the failures as much as the successes in your mind, what qualifies as a success? And maybe you want to use a couple actual examples, but what would be a success that is top of mind for you say in 2023 or 2024?

I think that there's different ways you could think about that. One way that I think is really important to think about is did the grantee meet the objectives they had set for themselves and articulated in the grant proposal they brought to us? So for example, if a club along the Gulf Coast suffered a bunch of hurricane damage to a bunch of repeaters that are sort of important for them for maintaining communications in that community and being prepared for future emergencies, and they come to us with a really straightforward, we want to put up these three repeaters on these three mountaintops and it's going

to cost this amount of money to refurb those sites.

Then just getting to the end of that grant and checking all the boxes and saying, yeah, we did all those things, it's all working. Thank you. ARDC, we're back in operation. That's an immense success. It's certainly meaningful to the folks that are involved. Phil Karn for a while was personally reading all the notes that came back from scholarship recipients that were receiving scholarships through things like the ARRL Foundation Scholarship Program, which we've been providing some sponsorship to for a set of scholarships. And he just conveyed to the rest of the board the immense joy he felt from students being able to pursue their academic objectives and being able to do so in ways they might not have been able to if we weren't there.

But I'll tell you personally, the projects I get most excited about are the ones that have the potential of having longer term bigger impact on larger communities. So that could be a research and development program coming up with some new codec technology or figuring out how to do a different kind of approach to HF digital communications. It could also be projects like HamSci. I've been very excited about our sponsorship of HamSci. Here's citizen science being undertaken by ham radio operators taking advantage of the spectrum that we have available and their willingness to be sort of volunteer participants in scientific data collection and discovery. That kind of stuff's really exciting and I think it goes a long way to justifying ham radio's continued access to spectrum and other resources.

So we've identified various specific grants in things like our annual report things, the USS Hornet's radio room got some refurb. And it's really interesting. It's been an interesting learning that different people have, for example, really different constraints doing something like fixing an antenna. If you are, for example, an individual ham radio club repairing or again repairing a repeater on a mountaintop, maybe all you need is an antenna and some feedline and some connectors and some volunteer will go climb the tower and fix the thing. If you are a student ham radio club at a university, the university probably won't allow a student to go climb a tower and work on an antenna.

So all of a sudden now you've got to have some third party firm has to be contracted to come in and do the work. And then if you're like a historic site like former military naval vessel sitting at dock somewhere, you have all of those issues, plus how do we not hurt the poor tourists who are coming to visit the site and maybe there's extra constraints because people have to hang out over the water to do things or whatever.

All legitimate concerns.

Yes. And so what this means is this is part of why there has to be a human element in this whole grant analysis process because every once in a while, if you just took a grant proposal and looked at it in a vacuum, you'd go, what in the heck does it need that much money to do that thing for? And then you unwind it and you go, oh, right, okay, that's an interesting set of constraints. And then the question is, is the result going to be something that's meaningful enough that it's worth funding anyway?

I've seen a lot of interesting successes. We have such a diverse range of grants as I mentioned. I think the HamSCI stuff is particularly interesting to me, and I'm also really proud of the fact that we've been able to provide significant sponsorship for things like ARISS, the amateur radio and the International Space Station program impacts a lot of kids. It's a very high profile, very visible activity that's promoting amateur radio and sort of the spirit of cooperation and connectedness that I think is important for us to keep going. So there's a lot of good stuff there.

Shifting priorities

Bdale, you'd mentioned earlier that in the early days of the ARDC, once you had the assets that you were able to get from the sale of the IP addresses, it sounds like you were working hard to push the money out the door to meet the IRS requirement.

I presume with everything you've told me that your priorities maybe have shifted some over time as you've gotten better at the process, maybe you're not pushing the money out the door looking harder for the right project.

How have those priorities shifted over time and what do you find you and your team being more or gravitating more toward?

Yeah, that's a really good question. When we were first getting started, one of the things that we were faced with is that when you all of a sudden have a whole pile of financial assets and you're no longer subsisting as a nonprofit on the basis of public donations like the Red Cross or somebody who goes out and solicits donations and use those to go do good things in the world. That's the kind of 501c3 nonprofit organization that most people in the US think of when they think of a nonprofit. But when you all of a sudden have a big pile of assets, you transition to the form of a nonprofit called a private foundation.

And private foundations have a bunch of rules that I think were originally set up to ensure that wealthy families didn't just hide a bunch of money under the name of a foundation and go do whatever they wanted to with it while pretending that it should be tax exempt. And so one of those rules is that we have to distribute a minimum of 5% of our assets each year. Now that sounds bad at first like well, that means you're not going to be around very long. But of course those who understand the process of creating investment plans and managing a portfolio that has nine figures in it, your goal is always to generate enough income from that investment portfolio to more than overcome that 5% minimum distribution requirement.

And in fact, we've been really successful at that because as I said, we started with roughly $109 million. And I believe that even in the sort of weird market conditions we're in right now, current balance is like $120 million, and in that time we've given away something like $30 million bucks. So on some level it's working. But one of the things that happened early on, we really were unsure how we were ever going to be able to give that much money away.

And until we built a staff that understood how to do this, and until we had volunteer committees in place who were happily getting together and spending their time helping to review proposals and analyze them for us in the early days, it was sort of like, oh, that seems like a good idea. Let's put some money behind that. And what's happened over time is that people have come to realize that, oh, we are here. We do really have a big bucket of money, and if there's a good idea, you should come to us and ask us.

And the side effect of that is that we're now down to where only about 30% of the incoming grant proposals are actually able to be funded. And the interesting thing is, if you look at it, we had a year or two where we were more generous than we needed to be under the IRS regs. And the way the IRS works is if you give away more than the required minimum distribution as a private foundation, you're allowed to carry sort of that positive balance forward into succeeding years. If you fail to distribute enough, you have to very quickly in the next year make that up. And so it's sort of biased towards this notion that generosity should be rewarded, which feels good. But what we realized at some point is that just looking at the bank balance and going, oh, it was $109 million and now it's $120 million and we've given away a bunch. From a straight dollar standpoint, that seems pretty good.

But if you factor in the effects of inflation and you think about what the purchasing power in 2019 was of the balance then and the purchasing power today of 120 million, it's not so great. And so what the board decided was to dial the knob down a little bit and get closer to actually sort of meeting the minimum requirement, not being overly generous as a way of preserving the value of the portfolio, not only in simple dollar figures, but in sort of purchasing power after inflation kind of terms.

All of that's kind of boring. Nobody really cares. But what it means is over time we have become more selective, but it's not really that we've changed our priorities as much as we've started to understand that there are some kinds of proposals that are more likely to have, provide more benefit to more people, and those might therefore be more desirable, particularly if they're large requests. At the same time, we continue to want to aid and abet the growth and preservation of ham radio, which often means saying yes to modest requests from ham clubs for things they need to make their local community better and to attract more participants. And of course, there's this sort of undercurrent all the time of education is a really important thing, whether it's teaching ham radio classes to kids in middle school or whether we're talking about lifelong learning and the kind of thing that all of us, I hope is ham radio folks are sort of technically interested and curious enough to want to keep learning.

The future of ham radio

So I'm really curious what your thoughts are about the future of ham radio because it seems as though everything you're doing really at its core not only is funding the future of ham radio, but it's also dependent upon it. It doesn't make sense to be doing education and funding clubs and innovating if there's not enough ham radio operators around to take advantage of it.

Right.

In some ways does a corollary between that statistic and even your portfolio to have a healthy ham radio community,

Yes.

we need to see those numbers growing. So there is a lot of conversation going on ever since I got back into ham radio a couple of years ago about the future of ham radio. What is the ARDC's take on the future of ham radio and how do you think that you can best impact that?

Yeah, you have the easy questions all the time, don't you? So the interesting thing is I've heard people talking about the potential death of ham radio since I joined the hobby in the eighties. It's been a persistent concern. And look, part of the reason is that I think historically and even today, the ham radio community demographic leans heavily towards older male, a lot of retirees, a lot of folks that are at the empty nester stage or beyond, where frankly they've got more free time, they've maybe got some disposable income. All of those things actually matter for hobbies. After all, ham radio for a lot of folks really is a hobby. It can also be an immense source of personal gratification for participating in public service things and so forth.

So I think part of what I'm trying to say is it's not like this is a new phenomenon. It's been around forever. And there really a couple of things that I think we've been trying to do about this. One is we really are trying to be an international organization and not just US-centric. After all, the internet is worldwide. The TCP group community and its follow on the modern 44 Net community are truly international. And if you look at the distribution of our grant money over time, I think we're at the point where last year something like 25% of the grants we made by grant count were outside of the us.

So that's one part of it is trying to make sure that that part of our vision that's about a thriving global community is really true. Another piece is about trying to entice people who are not currently part of the ham radio, milieu, to come and join us and play along. And that's where looking for communities of people that have been overlooked for one reason or another, or trying to do things that reach into student communities that would not have necessarily thought about ham before. All those sorts of things are important, but one of our board members made the observation not long back that there's also nothing really wrong with leaning into our strengths.

And so to some extent what that means is if there are particular human demographics that align well with ham radio as evidenced by who ham radio currently is, we shouldn't not pursue more people in that demographic. And so that's why we have this sort of ongoing interest in things in grant proposals that sort of provide more enthusiasm for people that are already part of the ham radio hobby or provide learning opportunities or make it easier for people to entice and drag in their friends. Because I think we need everybody. We need more people like us being part of the hobby. We need a lot more people that aren't quite like us being in the hobby. We need to not limit ourselves in our thinking about sort of who the target audiences are.

One of the interesting things about being part of ARDC is that we don't do don't, I dunno what the right way to say this is. We don't do a lot of work ourselves. We are all about other people with good ideas coming to us, and we maybe have the opportunity to provide them resources, whether it's dollars or maybe it's address space in the modern era with internet version for addresses becoming hard to come by. A significant asset we can offer to certain sub communities is just access to address space. And so those are all things that I think we can apply. I think one of the common threads and discussions among the board members is that all of us feel like ham radio in some way really helped us have the careers that we wanted to have and helped us be able to do the things we wanted to be able to do as individuals and make an impact in the world. And we really hope over time that that's something that more people can be exposed to and have the ability to feel as well.

Visionaries

Bdale. when you look at the grant applications, I'm curious how many, and I'm not looking for you to quantify it, but generally, are there many visionaries in that stack of applications from listen to you talk, you have what I'd consider infrastructure, fix the repeater, fix the antenna,

Right.

… build the station at the university, you have another category of innovation, which by definition is vision. But beyond that, how many are visionary toward the future of ham radio? Are you getting ideas or plans from people that really have big ideas to expand the hobby, to build upon our strengths to add more people at any age group? I love what you said about older people. Obviously it makes sense that we're involved with the hobby because we have some disposal income, we have time. It makes sense.

And I love what you're saying also that maybe there's somebody that isn't my age that's in their early forties, that if they just had a bit of encouragement, they would also do it. I think sometimes there's maybe a large proportion of attention given to getting youth involved, which I'm all for, but we're kind of missing the categories of people that could do it. But getting back to my question, are you seeing very many what I'd consider visionary plans that you and your grants team looks at and says, oh my God, we've got to get these people in right away.

So one of the things that's a little tough about answering that question, Kevin, honestly, is that as a board member, I don't actually read all the grant proposals that come in. I actually believe very strongly in this notion that when we've put together an amazing pool of talent participating in something like our grants advisory committee, that it's really important to let them be pretty independent in that process. And so the grant proposals I see tend to be the ones that have made it through the vetting process and are to the point of needing a final approval. Though every once in a while someone will flag a proposal as either being something they think I personally should go take a look at for one reason or another, or for whatever reason. I'll go look every once in a while. It's because I have heard through the grapevine that somebody I know is put in a proposal. I'm just curious to see what it is.

But part of the process we've built is one where favoritism just kind of doesn't exist. It's a very balanced process with a lot of checks and balances in it. I think some of the things that we've seen, we've seen some interesting approaches to education, particularly childhood education. One of the things that I think we've wished sometimes is that some of the proposals that were really interesting in sort of a local area were more convertible into something that lots of people could do, which is why in our recent strategic work as a board, one of the high value areas we identified as sort of a priority for future granting is open source education. And there we're really talking about things like curriculum development, things that would create assets that could be used by lots of different people in different places at different times, scalable hands-on projects that clubs could take on to get more people actually playing with electronics or figuring out how to actually use new modulation and coding schemes, actually trying a digital voice contact for the first time or whatever.

One of the places where I think there's an opportunity for us to help fan the flames more over time is to take things that seem innovative and cool, but are at a sort of really small area of focus. Somebody who's had a great idea for how to do a thing at their school or in their community or for their club and try and figure out how to convert more of those into things other people can really learn from. Our staff has been talking about having some gatherings, more gatherings of existing grantees to sort of share results of their work and talk to each other and kind of present to each other. And I guess I have a hope that in the same way that I know people go back and look at videos of talks that I've given and other people have done at things like Linux conferences around the world that could over time become a body of inspiration or good ideas that could be picked up and shared. But I think in terms of, I think that's probably the closest I can come to a useful answer there.

I'm fascinated from time to time when somebody has an interesting technical proposal as sort of a geek engineer myself, I kind of get excited when somebody has a cool new thought. Unfortunately, with a bunch of really technically strong folks on the board, we often pick those to pieces and spend a lot of time with it. Yeah, that's been done before. That's a cool idea. And if it could actually work, it'd be great. But there's these little laws of physics that are unlikely to allow that to be a thing that happens. It's always a balancing act, right? You have people with great ideas. I remember it was one of those proverb things, man, who say it cannot be done, should not interrupt man doing it or something like that or get in the way of the man doing it.

So there's a balance on all of these things. But we do see an interesting proposals, but in terms of how to actually get more great stuff to come in, I mentioned open source education, we've done some funding of some space related projects, some cube sat projects and things like that. The ones that have really gotten our attention have tended to be ones where there's some real tie in to either community development or educational processes or something. The board generally would love to see more interesting proposals for things that involve space assets. We've seen a lot of enthusiasm in Europe where AMSAT DL (German branch of the global AMSAT organization) has managed to get a high orbit geosynchronous capability because all of a sudden it kind of lowers the barrier to entry and more people can play with that. And there's a resource that's just available all the time to experiment with. It'd be cool to see some of that kind of stuff available over North America, but there are big hurdles to making stuff like that happen. And for us to see a proposal, that's something we'd be willing to fund. It will require some innovative thinking or a recognition that there's an approach that we maybe haven't thought about before.

Scaling

Well, I do love the idea of scaling, and I think as you were talking about things that are scalable, it does make me think about all the people I've talked to and there are visionaries in certain states or in certain communities or with certain clubs. I don't think they've necessarily thought about how they could scale upwards. And we talk a lot about clubs getting better and how some clubs are underperforming. But I've talked to some club members that have amazing clubs, and if you could just kind of package what they do,

Yes.

and offer that as education to somebody else that why couldn't you do that times 10x, 20x, 30x? So I think you're onto something with the scalability, for sure. Bdale, if you were to look ahead, say 5 to 10 years, what would you hope ARDC would be known for in 5 or 10 years? And how would you have evolved in that period of time?

I think first off, I hope that we're still here and still doing great work. I don't know that I personally will be part of the organization forever. Let's face it, there are lots of really smart people in the world, and I hope that we have a rich and robust evolution of who the people are that are involved. The board of directors recently went through an exercise where we articulated an actual vision statement for ARDC, and then from that developed some strategic objectives. And I think that vision, the easiest way I can answer your question is to say that if we are successful at doing what we're trying to do, our vision would come true.

And that vision is that if we're successful, we would see a thriving global community of learners, experimenters and contributors advancing freedom with open source communication and information technology. And so what I'm hoping we're driving towards and what I'm hoping we're helping make happen is people all over the world being able to use amateur radio and related digital communications technologies available on unlicensed spectrum to build community, to collaborate with each other, to make their communities better, to make the world a better place.

And if we're successful in any small way at making that happen, then I'll feel like all the effort we've put into this and the ongoing work of our staff and all of our volunteer committees is worthwhile.

Bdale, given what you have accomplished as an organization and how professional you have created this foundation, my bet is that you will accomplish that.

I hope so. I really do. I really appreciate you taking the time today. Thanks, Kevin.

It's been a pleasure chatting with you. And look, I really appreciated, I commented in our recent, in my closing letter in our recent annual report that every time I have a chance to interact with our volunteer committees, I'm just reminded and sort of astounded at the caliber of individuals and the amount of energy that they are committing to try and make ARDC work. And I feel profoundly grateful to all of those people. And anyway, really appreciate your interest and everyone else's interest in ARDC and hope we can keep great things.

My name is Kevin Thomas, W1DED. I've been talking to Bdale Garbee, the president of the ARDC. You really need to go to their website and check this organization out. If you haven't heard about them, it's time to find out about them - doing great work for ham radio. Thanks again, Bdale.

Thank you, Kevin.

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N8GNJ's Takeaways from the W1DED / KB0G Interview - DreamNet and GEO

By Steve Stroh N8GNJ

DreamNet

> … I think it was 1989, we held one of the ARRL TAPR Digital Communications conferences at the US Air Force Academy just north of Colorado Springs. And in fact, Andy Freeborn, who I mentioned a few minutes ago, was the one who was sort of the lead organizer of that event. And I got roped into ringleading a discussion on Sunday morning. We often had sort of tutorials or other topics on the Sunday after the conference was mostly over and the topic was sort of an open discussion about something we ended up calling DreamNet, which was this notion of if we could do anything we wanted with Packet Radio, what was it we wanted to do?

K0BG's mention of the DreamNet discussion tweaks a memory that I *think* I was present at that discussion, though I would have been a passive observer. At that time, I was still very new to Amateur Radio Packet Radio in the Seattle area, and at that time we were using 1200 bps AFSK, digipeaters, and Packet Bulletin Board Systems (PBBS').

Thus I was in awe of the concepts being discussed then with advanced (for the time) routers, gateways, fast data radios, etc. You can get a flavor of the "advanced" discussion from the November, 1989, (#36) issue of the TAPR Packet Status Register (PSR) newsletter, particularly the Bits in the Basement column by Bdale Garbee (then) N3EUA.

Arguably, DreamNet is Operating in Europe

In my perspective, "DreamNet" as we imagined back then, now exists in Europe, which has developed Amateur Radio higher-speed data networks, including:

- There are (I've read) a number of networks of New Packet Radio, that connect to…
- HAMNET - a (very) wide area microwave network.
- AREDN usage is growing in Europe.
- There's also a lot of traditional Amateur Radio Packet Radio activity, including a resurgence (again, that I've read) in the UK.
- And, most critically, the QO-100 Amateur Radio payload in GEO orbit with a footprint of *most of the Eastern hemisphere*. Any Amateur Radio Operator within that footprint can communicate via data with any other Amateur Radio Operator - solely via Amateur Radio.

All of that infrastructure can be (probably already is) connected together via TCP/IP IPv4. Europeans seem to be one of the most intensive users of 44Net IPv4 blocks of addresses, and perhaps the largest user of 44Net IP addresses strictly for use with radios. Europe has the advantage of being relatively population-dense, similar to the US East Coast. That population density (critical mass) can support such infrastructure and a large enough user base to make it interesting and sustainable.

DreamNet in North America - Work in Progress / Recovery

Pros for a potential DreamNet-NA:

- We've done it before in the Packet Radio era, with large regional networks such as TexNet.
- The US has an enormous number of repeaters, most of which are not being used much now (quiet repeaters).
- The US has a number of regional Amateur Radio microwave networks, but many do not provide user access. Those could potentially be used to connect DreamNet-NA Points of Presence (POPs).
- AREDN is well-known and popular in North America with a large number of regional AREDN networks operating on 5 GHz.
- Amateur Radio in North America has the advantage of the 902-928 MHz 33cm band, and thus can take advantage of 802.11ah / Wi-Fi HaLow technology which can be easily linked into AREDN networks.
- The technology exists for higher-speed Packet Radio networks using improved techniques such as Hop By Hop acknowledgements (such as Net/ROM and TexNet did), Forward Error Correction (FEC), and multiple VHF / UHF bands.
- It's easy to get an entry level license for operating on VHF / UHF (US - Technician, Canada - Basic) if techies become interested in building and using DreamNet-NA.
- There is a demonstrated funding source for advanced Amateur Radio Networking in ARDC, which has funded a number of Amateur Radio network projects.
- **Last minute update** - now we (potentially) have New Packet Radio *data radios* for building Amateur Radio data networks on 2m and 70cm. See the lead story in this issue - **(Breaking!) Plug and Play New Packet Radio Units Available from Localino… Including for 2 Meters!.**

Cons for a potential DreamNet-NA:

- The US has a lot of geographic / terrain / low population issues in the Midwest and Western regions.
- The US Amateur Radio population is generally conservative (interested mostly in legacy Amateur Radio technologies and operations).
- North America does not have an equivalent of the QO-100 Amateur Radio payload in GEO orbit. Thus we have no way of communicating at high speed between any two Amateur Radio Operators in North America, other than HF or Internet.

We could (still) put together a DreamNet with various technologies, including regional HF (especially Near Vertical Incidence Skywave - NVIS), Higher speed packet radio networks such as the example of Terrestrial Amateur Packet Radio Networks - TARPN, SuperPeaters, New Packet Radio (perhaps on 144-148 MHz 2m as well as 420-450 MHz 70 cm), IP400, and especially a more widespread recognition of mesh networking from a combination of all of those heterogeneous technologies… again, all knitted together with TCP/IP and unified IPv4 addresses provided by ARDC / 44Net.

I'm not unrealistic enough to say that a DreamNet-NA *will* happen…

but I'm idealistic enough to imagine that a DreamNet-NA could happen.

As I was doing the final edits of this issue, the analogy of planting trees occurred to me. Folks who plant trees tend to be altruistic optimists because in many cases, they'll never benefit from the shade or the fruit of the mature tree that they planted. The analogy is that by leading / directing ARDC to provide grants for Amateur Radio Research and Development, and building out infrastructure, KB0G and KA9Q, both of whom imagined DreamNet all those decades ago, will likely never get to use "DreamNet" that's built in the 2020s and beyond (as imagined elsewhere in this issue). But with the grants, they and the rest of ARDC are enabling DreamNet to be created.

GEO Capability for Western Hemisphere

> It'd be cool to see some of that kind of stuff [a GEO capability similar to QO-100] available over North America, but there are big hurdles to making stuff like that happen. And for us to see a proposal, that's something we'd be willing to fund. It will require some innovative thinking or a recognition that there's an approach that we maybe haven't thought about before.

This is simultaneously exciting and stimulating that ARDC is "willing to fund [a GEO capability for Western hemisphere]"… and *frustrating* that no group, with significant satellite background, has apparently approached ARDC (as of 2025-04-30) with ideas for an Amateur Radio GEO capability for the Western Hemisphere. Such ideas and capabilities *seem to exist*… they're just not being considered, or at least discussed in public (that I can find)… *except here in Zero Retries*.

AMSAT-US isn't talking about GEO capability for the Western Hemisphere.

AMSAT-CA isn't talking about GEO capability for the Western Hemisphere.

Open Research Institute does… *research* on satellites potentially applicable to GEO, but last updates are from 2022.

*The **one** entity that **is** talking about a GEO capability for the Western Hemisphere* is AMSAT-DL with backing from the *European* Space Agency - The next generation of a GEO/MEO amateur radio payload?

?!?!?!

It's not like there aren't potential options for GEO capability, such as the "Micro GEO" mentioned below, worth serious consideration. I wrote this in an email this past May:

> My article in **Zero Retries 0079** - AmGEO-200 - Western Hemisphere GEO Payload - https://www.zeroretries.org/i/90015044/amgeo-western-hemisphere-geo-payload
>
> My article in **Zero Retries 0103** - Moonshot 2 - Western Hemisphere GEO Satellite / Payload - https://www.zeroretries.org/i/127412471/moonshot-western-hemisphere-geo-satellite-payload
>
> My article in **Zero Retries 0171** - A GEOSAT for North America? https://www.zeroretries.org/i/149307135/a-geosat-for-north-america
>
> That article referenced this one:
>
> https://arstechnica.com/space/2023/05/internet-from-a-small-satellite-in-geostationary-orbit-sure-why-not/
>
> Which references this GEO satellite already launched and in orbit servicing Alaska:
>
> https://space.skyrocket.de/doc_sdat/arcturus.htm
>
> Which was built by:
>
> https://www.astranis.com
>
> Stating it incredibly simplistically, it seems to me if Amateur Radio wants a GEO over NA, it's now down to a matter of funding. No uncertainties about launch capability or manufacturing time or technology - just state the technical parameters, write the check, and wait for it to be activated in orbit.

My email correspondent… didn't correspond further.

I'm a dilettante when it comes to Amateur Radio satellites (building / launching / orbiting / management) *and I could find this stuff*.

Others with "depth" in the satellite industry cannot do better? Do something?

Other than that point of frustration, it was a great interview. My thanks to Bdale Garbee KB0G and Kevin Thomas W1DED for an interesting couple of hours listening to the discussion.

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Thought Experiment on the Linux *Mobile* Transceiver

By Steve Stroh N8GNJ

The LinHT - Linux Handheld Transceiver project is well underway and making good progress with the goal of creating a user-definable Software Defined Portable Transceiver. That project is nowhere near complete yet, but I recently corresponded with a Zero Retries reader, and the resulting discussion triggered this thought experiment.

If the LinHT is Linux Handheld Transceiver, then LinMT could be the *Linux **Mobile** Transceiver*. I won't rehash the previous discussions about how powerful and impactful and "game changing" the LinHT will be, but I think it's worth imagining what a spin-out of the LinHT into a mobile radio form factor.

I think that the basic technology of the LinHT can be "transplanted" into a LinMT while maintaining compatibility (software, processors, etc.) between the two units.

Some additional advantages of a LinMT beyond the capabilities of the LinHT:

- Physically larger, so a larger printed circuit board could be used.
- Access to more electrical power (12 volt input).
- Higher transmit power (25 watts) due to available higher current, room for a 25 watt power amplifier, and room for a large heatsink or fan for the power amplifier.
- Potentially multi-band, using modules for VHF and UHF (the modules aren't that expensive) along with single-band power amplifiers in the same enclosure.
- Ethernet connectivity (in addition to USB and Bluetooth [eventually] present on LinHT.
- A "helper" compute module that could optionally add more processing capabilities such as the IP400 OFDM addressable subcarrier capability discussed previously in Zero Retries.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

(Breaking!) **LinHT – a Complete M17 Transceiver (Finally!)**

Wojciech Kaczmarski SP5WWP on the M17 Project website:

> We've just got LinHT to work as a complete M17 transceiver – able to transmit and receive RF signals without the need to use SSH to issue any commands. This was not as easy as we expected, due to ALSA-related problems (Linux users probably know what I mean).
>
> The issue was GNU Radio not allowing us to use SX1255 baseband source and sink within a single flowgraph. Just to remind you – the SX1255 is seen by the OS as a sound device. I and Q baseband branches are disguised as *Left* and *Right* audio channels 🙂 Andreas OE3ANC proposed a simple workaround – daemonized ZeroMQ publisher/subscriber proxy for both directions. Then, instead of using GNU Radio's Audio Sink/Source blocks, the baseband is accessed through ZMQ PUB/SUB blocks. PTT signal is handled as GNU Radio's native "Message PMT".
>
> Right now, using LinHT for M17 is as simple as turning the device on and a PTT press. The GUI daemon loads all the RF front-end and M17 settings from a YAML file. There is still a lot of work to do, especially to improve the receiver path, as the SX1255 is *really* sensitive and gets saturated easily. This is why we added a variable RF attenuator in Rev B.
>
> None of the achievements or work mentioned above would be possible without our core contributors: **Andreas OE3ANC** and **Vlastimil OK5VAS**. Working on LinHT with you is an amazing journey!
>
> A demo video will be shared later, while LinHT's Revision B is still being prepared, so **stay tuned**!
>
> **Edit:** this is how our M17 transceiver looks like, defined with a GNU Radio flowgraph. Two upper signal paths define the *receiver*, the last one (bottom) is the *transmitter*. Big shout out to **Jean-Michel Friedt** for all the help with gr-m17 development.
>
> Link to full size flowgraph

See also LinHT – Rev B Update for a look at the Rev B LinHT circuit board in progress.

Kudos to the LinHT development team - great progress!

Opinion: futureGEO is the Most Important Amateur Radio Initiative of this Decade. Why is no one Talking About it?

*From the **Great Minds Think Alike Department** here at Zero Retries, Cale Mooth K4HCK (who is one of the Zero Retries Pseudostaffers) wrote this article on Amateur Radio Daily - completely independently of the GEO Capability for Western Hemisphere section above. He released it on the same day I completed my GEO Capability… sub-article.*

> You might not know it, but plans are currently in progress to launch a geostationary amateur radio satellite that would provide multi-mode communications coverage to Europe and most of North America. Led by ESA and [AMSAT-DL], the project is currently called *futureGEO* and would be the pinnacle of achievement for the amateur radio hobby.
>
> futureGEO is likely to be very similar to the QO-100 satellite that covers Europe, Africa, the Middle East, and a large portion of Asia. The major difference of course would be the inclusion of North America within FutureGEO's footprint, opening up geostationary satellite ops to one of the largest ham radio populations in the world.
>
> What makes futureGEO so compelling is the showcase of modern radio and software technology, as well as the relatively low barrier to entry to satellite communication. Like QO-100, futureGEO may feature analog and digital transponders as well as a fully integrated software defined radio stack. What that opens up is every existing ham radio mode, analog and digital, utilized through an easily accessible stationary satellite.
>
> …
>
> AMSAT-NA has relayed updates from AMSAT-DL and contributed to a proposal in 2023, but very little promotion has been published to their website. Earlier this year I asked about futureGEO updates at the AMSAT booth at both Hamvention and Huntsville but they weren't able to relay even basic talking points. IARU is credited with starting the conversation, but there's no mention of the project on their website.

K4HCK's experiences with AMSAT-US6 are similar to mine… pretty inexplicable - those that "should" know… seem ignorant. *Perhaps* something else about a Western Hemisphere AR GEO (besides FutureGEO) is going on behind the scenes that's "super secret". But, my experience is that the (US) Amateur Radio rumor mill is powerful and leaky. If something *was* happening, something would have leaked by *now*. My conclusion is that nothing substantive is going on, other than FutureGEO.

> If this project interests you, I'd highly encourage you to find a way to help promote it. Present about it at an upcoming club meeting. Mention it on the air on the local repeater. Post to your favorite Facebook Group. It's up to us.

With this, I wholeheartedly agree with K4HCK. I playfully (at first) proposed to K4HCK to form a…

Ad hoc promotion committee for a Western Hemisphere Amateur Radio GEO

But maybe… *really do that*? Let K4HCK and I know your opinions.

And, while K4HCK joined AMSAT-UK, in a previous issue of Zero Retries, I proposed to join AMSAT-DL (*because they're the organization that's working on FutureGEO*) , and by the time you read this, will have done so.

ARDC 2024 Audited 990-PF (Tax Return) & Financial Statements

Rosy Schechter KJ7RYV, Executive Director / CEO of ARDC:

> Transparency is one of our core values at ARDC. Thus it's important to us that, every year, we take some time to walk through our audited financials, and to do our best to make sure they are understandable by everyone – including people who do not spend their days analyzing 990s.
>
> With this in mind, today we are pleased to share the results of our 2024 audit, conducted by Redwitz. You can now find our 2024 audited 990-PF (tax return) and financial statements at https://www.ardc.net/about/legal/ardc-finances/.
>
> - 2024 Audited Financial Statements
> - 2024 Tax Return (IRS Form 990-PF)

KJ7RYV's article is a very readable overview of ARDC's finances in 2024. I normally wouldn't include "administrivia" such as this in Zero Retries, but it seemed appropriate to do so given the recent in-depth coverage of ARDC in the previous, and this issue of Zero Retries.

FreeDV v2.1.0 Released

Mooneer Salem K6AQ on the FreeDV website / blog:

> FreeDV 2.1.0 has been released, containing bugfixes and feature enhancements, including experimental support for integrating FreeDV with SmartSDR (for Flex 8000 and Aurora series radios). It can be downloaded using the following links:
>
> Windows: https://github.com/drowe67/freedv-gui/releases/download/v2.1.0/FreeDV-2.1.0-windows-x86_64.exe
> Linux AppImage (for Intel and AMD PCs): https://github.com/drowe67/freedv-gui/releases/download/v2.1.0/FreeDV-2.1.0-x86_64.AppImage
> Linux AppImage (for ARM systems, e.g. Raspberry Pi 5+): https://github.com/drowe67/freedv-gui/releases/download/v2.1.0/FreeDV-2.1.0-aarch64.AppImage
> Linux AppImage for FlexRadio support (needs Raspberry Pi 4 or newer):
> macOS: https://github.com/drowe67/freedv-gui/releases/download/v2.1.0/FreeDV.dmg
>
> More information about this release (including additional downloads) can be found on our GitHub release page: https://github.com/drowe67/freedv-gui/releases/tag/v2.1.0.

This is really cool that FreeDV (which incorporates RADE as the primary mode as of FreeDV v2.0) are close to being "just another mode option" for use in the current generation (Flex 8000 and Aurora series) of FlexRadio units. Being able to just select FreeDV as just another voice mode in a FlexRadio unit is a big leap forward for technological innovation in Amateur Radio, commensurate with the technological innovation represented by the implementation of Polar Modulation in the FlexRadio Aurora hardware.

This is the most "Zero Retries Interesting" news to date to seriously consider a FlexRadio unit for HF activity. The FlexRadio 8400 starts at $2500. Hmmm… *perhaps 2026*.

Hopefully a 21st century HF *data* mode could be developed and similarly integrated into Flex 8000 / Aurora series as "just another mode option" like FreeDV / RADE will likely be. While VARA HF will always be "external", perhaps Mercury will advance to the point of being "integrate-able".

Update on HF Signals zBitx HF Software Defined Radio

Longer term readers of Zero Retries will recall my interest, and purchase, of the HF Signals zBitx radio. In short, the zBitx is a low cost ($200, including shipping) low power (5 watts, claimed) portable (with 18650 LiPo batteries) HF radio that is user software defined. The zBitx uses the Linux operating system, and the compute hardware is a Raspberry Pi Zero 2 W. In short, I admired this particular combination of price, integration, and especially that it was open source and software defined, and I bought one earlier this year.

I confess I *still* haven't gotten my zBitx on the air. The combination of attending Hamvention 2025, then working on the initial Zero Retries Digital Conference during the summer, and continuing to publish Zero Retries each week, has kept me busy this year.

Thus I appreciate a diligent Zero Retries reader (who prefers to remain anonymous) keeping me apprised of the "State of zBitx". Some of the news of late is that the zBitx seems to suffer from some engineering (as opposed to early production) issues.

> I have been following along on Discord and groups.io as the community explores this radio.
>
> Turns out there is a 25kHz spur on the zBitx radios that exceeds the FCC limits, making this radio technically illegal to use for transmit in the US as shipped. The community has been exploring various fixes, with the latest involving desoldering a couple of [surface mount] parts and re-routing the connectivity path, and adding a copper foil shield covering a few components, which reduces the spur to just barely under the FCC limit.
>
> More details about the non-compliant spurs can be found on the groups.io list in the thread:
>
> https://groups.io/g/BITX20/topic/zbitx_transmitting/115077209
>
> Photos:
>
> https://groups.io/g/BITX20/message/121612
>
> https://groups.io/g/BITX20/message/121569
>
> There is also a bunch more info on the fix on Discord, with pictures:
>
> https://discord.com/channels/1026361918505635890/1400782766186172446
>
> There has also been an effort to replace the underpowered RPi Zero 2W with an RPi 5 to alleviate the many issues people are having with the inadequate compute resources.
>
> Unfortunately there hasn't been much progress in fixing the excessive heat and current draw problems. This is apparently going to need a redesign of the voltage regulator, finals, etc, and the general conclusion is that instead of messing around doing all of the above, you might as well just buy an sBitx instead.
>
> If HF Signals or the community releases a detailed set of instructions to "fix" the zBitx, I might attempt to retrofit my unit with those fixes.

Late breaking…

> Ashhar mentioned an alternate fix for the spur that looks easier to accomplish:
>
> https://groups.io/g/BITX20/message/121806
>
> I spent sometime looking at this. Here is a fix:
>
> 1. Change the C31 from 0.1uF to 10 pf.
>
> 2. Edit si5351v2.c, line 250 from
>
> set_freq_fixeddiv(clk, pll, frequency, pll_div, SI5351_CLK_DRIVE_STRENGTH_8MA);
>
> to
>
> set_freq_fixeddiv(clk, pll, frequency, pll_div, SI5351_CLK_DRIVE_STRENGTH_4MA);
>
> This reduces the drive to the diode mixer (it was being overdriven).
>
> You may have to slightly tweak the hw_setting.ini file to bring the output back to the levels.
>
> Let me know if this works, I will roll the changes to the repo and update the circuit. We have tested this on a few zBitxs here with repeatable performance.

This is encouraging, that HF Signals that the spur issue can be definitively fixed on existing and future zBitx units.

I don't quite understand how replacing the RPi Zero 2W (small form factor) with a RPi 5 (traditional Pi form factor) would work other than solely as a test, as the form factor of the latter is so much larger than the form factor of the former.

What's mildly disappointing is that undoubtedly these issues have, by now, been brought prominently to the attention of HF Signals, but there's no reference to such issues (such as the 25kHz spur, which doesn't seem to be disputable) on the zBitx purchase page.

My take, given that:

- The zBitx was an audacious new class of HF radio being a user defined Software Defined Radio, especially at the price point of $200 (with shipping from India).
- HF Signals is an innovative, but small company.
- The spur issue, given that it can only be fixed in hardware, probably should have been spotted as part of the development process. Ditto the overheating issues… but stuff happens.

Thus I'm not willing to pummel HF Signals for the issues with the zBitx. Again, HF Signals was audacious in developing the zBitx, and such attempts, even when they fall a bit short of the goals, *should be encouraged*. I, for one, will not be asking HF Signals for a refund, or demand that they fix my zBitx at their expense - for a $200 radio. That's just not realistic for a small company like HF Signals. Nor will I "dump my unit" on the used market.

I accepted at the time that the zBitx was a very new product and given the price, the risk of such a new product was acceptable *to me*. For my purposes, my zBitx may still be useful, even unmodified, as a basic HF transceiver that I can use within N8GNJ / Zero Retries Labs as "test equipment" on a dummy load. Perhaps even a pair of them. Or just use it as a receiver. Or, when the full package of necessary / recommended updates are developed by the community (or officially by HF Signals), dust off my Surface Mount Technology repair skills to update my zBitx(s) - and finally purchase the long deferred swing arm stereo microscope I have planned for N8GNJ / Zero Retries Labs.

Another use case that leaps to mind for the zBitx, even with the issues, is that it could be a nice demonstrator unit to showcase Amateur Radio as part of a presentation / demo, for example, in a STEM classroom. Use two units at lowest possible power (try to minimize overheating), run a basic mode that isn't too computationally taxing, etc.

My thanks to the Zero Retries "Special zBitx Correspondent" - *much* appreciated!

VGC BHM-88 Firmware Update

Michael Rickey AF6FB on his blog:

> VGC Has released their new Bluetooth speaker mic. The BHM-88 is available in black and tan and works with all of the "N" series radios.
>
> I have the non-display version of this microphone and it works really well. The addition of the display is interesting to me, not so much for use with a hand-held radio (like my VR-N76) as it is for the mobile VGC VR-N7500 I have. This radio has no display at all. Using the BHM-88 will give me a display and a better ability to use the radio on the go.
>
> In addition to the VGC radios, this microphone will pair with the Icom IC-705. It does not give a frequency display, but it does work as a speaker mic.

I've mentioned this class of Bluetooth wireless microphones before in Zero Retries, and they're pretty cool, especially with the potential for use with a mobile radio that can be concealed in a vehicle with no need to route a cable the front seat for a microphone or speaker.

But this mention prompts me to think of the potential of an open source project to make such Bluetooth PTT microphones usable with an app(let) or microcontroller unit that would enable them to be used with Amateur radio over Internet applications (no radio involved) on computers. To me, the PTT function makes it a bit more "radio'ish".

Hopefully in 2026, I'd like to put a basic FM voice radio back into our primary car, but I don't want openly display a radio as not to encourage (additional) break-ins to our vehicle while it's parked in urban areas. Thus a basic low profile dual band antenna (looks like a legacy cellular antenna), plus the concealed radio, and this microphone is close to ideal.

HaLow_Scanner: An RTL-SDR Based 802.11Ah HaLow Channel Scanner

RTL-SDR.com:

> Over on GitHub we've recently noticed the release of halow_scanner, a Python script that uses an RTL-SDR to scan the 802.11ah (WiFi HaLow) channels in the sub-GHz spectrum to determined which channels have the least noise/interference.
>
> Unlike standard WiFi, which operates outside of the RTL-SDRs range at 2.4 GHz+, 802.11ah operates in the sub-GHz ISM bands, which RTL-SDRs can easily receive.
>
> Use of these lower frequencies gives 802.11ah HaLow excellent signal penetration, making it useful for long-range, low-power IoT devices. With 802.11ah HaLow links, several kilometers can be achieved.
>
> The software's features include:
>
> - 🔍 Scans all 802.11ah HaLow channels in the US 902-928 MHz band
> - 📊 Supports multiple channel bandwidths: 1, 2, 4, and 8 MHz
> - 📡 Uses RTL-SDR for spectrum analysis

- 🎯 Identifies the cleanest channel with lowest noise floor
- 📈 Provides detailed power spectrum measurements
- ⚡ Fast scanning with averaging for accuracy

The more I read about 802.11ah / Wi-Fi HaLow, the more intrigued I become. Amateur Radio is blessed in North America to have Amateur Radio access (we can use higher power than unlicensed users) to the 902-928 MHz / 33 cm band. This app makes a lot of sense given the unique noise caused by other uses of the (shared between unlicensed and Amateur Radio) 902-928 MHz / 33 cm band in a given area. Using the most minimal 1 MHz channel, using 1024-QAM and 4 μS Guard Interval can net 10 mbps data rate. So automatically determining an optimum 1 MHz channel in a given area has real utility, and RTL-SDR units are good quality and reasonable price, thus worth investing in for 802.11ah / Wi-Fi HaLow usage to monitor the RF environment for this band at each station.

Perhaps it's time to get a pair of 802.11ah / Wi-Fi HaLow units on order that are supported by AREDN firmware:

Alfa Tube-AHM - On **Rokland.com** - ALFA Network Tube-AHM 802.11ah sub 1 GHz outdoor AP/CPE Morse Micro chip

Unfortunately, those will go into the too-deep project queue in N8GNJ / Zero Retries Labs, but at least they'll be available when I have Amateur Time Units available, instead of waiting for them to be available again from a reliable vendor.

The Final Fate of the TAPR Tangerine SDR Project

I've mentioned the TAPR Tangerine SDR Project several times in Zero Retries. TAPR received an ARDC grant in 2020 for Tangerine SDR:

TangerineSDR Prototype Build

> TAPR, Inc. is a non-profit 501(c)(3) organization of amateur radio ("ham") operators who are interested in advancing the state of the radio art. In this project, TAPR is working to develop TangerineSDR – a modular, direct-sampling software-defined radio (SDR).
>
> The funding provided by ARDC goes towards developing additional prototypes for Tangerine SDR's initial build, bringing the number that they can build from 6 to 25. These prototypes will be suitable for use as a Personal Space Weather Station (PSWS).
>
> **Project Description**
>
> The main board for TangerineSDR, or Data Engine (DE) consists of a MAX10 FPGA with modular interfaces to two RF Modules (RFM) and one Clock Module (CKM) slot. The DE includes a three-port GbE switch, a USB 3.0 device port and a USB 2.0 host port for communications interfaces. Expansion ports include a PMOD connector, a Raspberry Pi HAT connector and an enhanced RPi-compatible expansion port called a LEAF. Additional DE variants will follow, including a much more powerful Cyclone V-E based model with 301K Logic Elements (LEs).
>
> The RFM modules contain front-end calibration and filtering circuits, plus clock and digitization circuitry. One or both slots may be populated with RFMs. The RFM for PSWS is a dual-input synchronous direct sampling receive module using a dual-channel 14-bit ADC clocked at 122.88 Msps, with a receive frequency range of 100kHz to 60MHz. Other RFMs will follow, covering both receive and transmit ranges into the GHz bands.
>
> The low-cost TangerineSDR can operate without a CKM in non-demanding applications. However, the PSWS requires a very accurate time stamp on received data, so a GPS Disciplined Oscillator (GPSDO) will be fitted to the CKM slot. The GPS selection is still in progress, but the uBlox ZED-F9 series seem to be the most promising.
>
> All hardware will be licensed under the TAPR Open Hardware License (OHL), and all firmware and software will be licensed under GNU General Public License (GPL).
>
> Learn more at tangerinesdr.com.
>
> **Update**
>
> The TangerineSDR project enabled the creation of multiple prototypes for testing and development, impacting 25 beta testers, 12 HamSCI researchers, and 4 students. This resulted in technical talks and publications, and the design evolved into a more versatile SDR, supporting various radio modes and configurations for both beginners and experts. TangerineSDR now serves a range of use cases, including space weather research and radio astronomy. The design documents for the project are available on the Tangerine website at https://tangerinesdr.com.
>
> Although the main project has been inactive since 2023, the Magnetometer component remains actively used by HamSCI and is available for purchase in the TAPR Store.

But this is a vague explanation of the fate of the project - "inactive since 2023".

Of note on this subject, in 2021, there was a second ARDC grant relating to Tangerine SDR and TAPR:

Grant: TangerineSDR Test Fixtures

> Efforts led by TAPR have produced a modular, direct-sampling HF Software Defined Radio called the TangerineSDR. Education, experimentation, advancing the digital radio art, cloud-based networking, as well as heliospheric, ionospheric, magnetospheric and space weather research are all target use cases for the hardware. Thanks to the July 8, 2020 ARDC grant to TAPR, complete parts kits for the CKM and RFM prototypes have been purchased. Due to worldwide shortages of silicon chips, the FPGA chips for the DE are backordered until May of 2022, precluding the completion the DE build until then. TAPR is ready to assemble the CKM and RFM, but without the DE, there is no way to test them.
>
> To get the project moving forward again before May 2022, with the grant funds TAPR can now build an RFM adapter board, a CKM carrier

> board and a set of DE loopback test boards. The RFM adapter will allow the existing TangerineSDR RFM boards to plug into an available off-the-shelf MAX10 FPGA development board without modification. This will permit RFM design verification, DE FPGA firmware development and system software development before we have actual DE hardware. The CKM carrier will allow all the features of the CKM to be tested without a DE board. It will serve a second purpose, by transforming the CKM into a more general-purpose GPS-disciplined oscillator test instrument useable by scientists, academics, and amateurs. This solution will allow TAPR to proceed with development despite the shortages, and hopefully allow the shortages to be resolved before the project goes to production later in 2022.

In 2022, there was a *third* ARDC grant relating to Tangerine SDR and TAPR:

Grant: TangerineSDR Project Advancement

> This grant provides funding for Advanced Data Engine (DE-MK-II) design support, including float licenses for development tools, and for the MagnetoPiHat magnetometer build. This work will enhance the functionality and capabilities of the TangerineSDR modular SDR by adding an upgraded Data Engine to the existing stable of boards.

Note - no status update on the second or third TangerineSDR grant.

The TangerineSDR website echoes the status update on the first grant:

> This project has been inactive since 2023, The site is maintain a historical document.

In the TAPR PSR #159 Spring 2025, TAPR President Dave Larsen KV0S said in part:

> [TangerineSDR] was to provide new hardware for the 2023 and 2024 eclipses. The design could potentially work well but Covid, licensing and manufacturing issues stopped the project.
>
> In 2023, I met with Phil Karn, Rob Robinet, Dave Witten, John Ackermann and Nathaniel Frissel about using a simple USB device and a Software Defined Radio that work completely in Linux to replace the stalled Tangerine radio project. It worked incredibly well for the 2023 and 2024 eclipses and the associated solar flares in 2024.

Note the nebulous terms *inactive*, and *stopped* in reference to the status of the project.

Recently, on the HamSCI email list, Steve Kaeppler AD0AE asked:

> I was wondering if there are any status updates on the design and fabrication of the TangerineSDR or the current HamSCI SDR project status? I thought there would be a new SDR that would more closely follow the RX888 design, perhaps with some time synchronization and other enhancements. However, maybe I just don't know what is going on anymore!
>
> I tried to look on the HamSCI website but didn't find anything current.

TAPR Director George Byrkit K9TRV replied:

> The Tangerine SDR was discontinued officially several years ago. COVID, the semiconductor shortage, and Intel buying Altera and making the Max 10 mostly unavailable, killed the project.

With that, hearing a definitive status of the Tangerine SDR project:

> The Tangerine SDR was *discontinued officially*…

from an individual with standing (TAPR Director).

With that, I think we can now know the *final* fate of the Tangerine SDR project.

Kudos to the TangerineSDR developers for keeping the site online as a reference. But as such things go… just in case, I did a snapshot of into the Internet Archive Wayback Machine - https://web.archive.org/web/20251117234802/https://tangerinesdr.com/.

It's always been puzzling to me why the TAPR website isn't more transparent about many of its activities. For example, there's no link (that I could find) on the TAPR website about the linkage between TAPR and the TangerineSDR project.

Nor is there any mention of TAPR's ownership of the APRS trademark ceded to it by APRS creator Bob Bruninga WB4APR (Silent Keyboard).

Origin Story of Phased Array Antenna Technology (video)

Related to Amateur Radio - open.space open source phased array unit for the 5 GHz band.

YouTube's algorithm has parsed that I am interested in technology history documentaries, and so has inserted a family of mostly AI generated videos. The audio portion of these videos is where the real content is - the video is a sparse slideshow of loosely related historical photographs. I typically put my earbuds in and do something that requires hands-on and ignore the video.

I've invested in YouTube premium, so I don't experience any disruptive YouTube inserted advertisements. My experience is that YTP is well worth the modest cost.

The audio content, despite being (obviously, hilariously at times) AI generated (it really has trouble pronouncing date references), is actually pretty good and informative overall. These would make good podcasts, but obviously YouTube is more financially lucrative.

I had not previously encountered this particular origin story of the development of the US Navy's AN/SPY-1 (AEGIS) phased array RADAR / combat integration system and the (alleged) disruptive effect it had on the Soviet Union's naval doctrine.

Fast forward *50 years of progress in radio technology*… and I'm using a portable (not quite handheld, but *almost*) flat panel phased array communications antenna with the Starlink Mini terminal… that Starlink supplied to me *free* in exchange for a $5/month additional fee for 500 kbps Internet service… which is surprisingly useful.

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My ongoing ***Thanks*** to:
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Shreky Stroh, Late Night Assistant Editor In training

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*Keywords in **Bold** are regular mentions in each issue.*

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

1

I was going to disclaim that my reference to penguins in this discussion about technology wasn't really about Linux… but actually, referencing penguins actually fit nicely - it's the *Linux* Handheld Transceiver, after all!

2

I was *really* disappointed that this particular grant didn't work out - it had a lot of promise - on paper. But the development team apparently just didn't come through with a design that could be replicated… or something. To date, ARDC has not furnished a followup to this grant.

3

Yeah, Amateur Radio *should be forward-biased and trying to transition to IPv6*… but that's a problem for a few more years down the road. NPR hardware is set up for IPv4, and we have plenty of IPv4 addresses in 44Net for use by Amateur Radio.

4

Perhaps… the commenter was referring to the limited privileges of US Technician class Amateur Radio Operators in the HF bands?

5

Acknowledged that ARDC's "roots" are in the 20th century, but its current incarnation was formed in the 21st century.

6

Now that there is, formally, AMSAT-CA (Canada), it seems reasonable to me for "AMSAT-NA" to transition to using AMSAT-US. I doubt they will do so, but it makes for easier differentiation between the "US" AMSAT organization and the new AMSAT-CA, which has been formally recognized by "AMSAT-US".